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## NOVEL POLYPEPTIDES AND NUCLEIC ACIDS ENCODING SAME

### RELATED APPLICATIONS

- 5           This application claims priority to USSN 60/171,746, filed December 22, 1999, which is incorporated herein by reference.

### BACKGROUND OF THE INVENTION

- 10           Mammals are able to discriminate between thousands of odor molecules. This capacity relies on a multigene family encoding 500 - 1000 olfactory receptors (ORX) *See* Buck et al., (1991) *Cell* **65**, 175-187. These receptors are expressed mainly in the olfactory epithelium and have been found in a number of species including mammals, birds, amphibians, and fish. *See* Buck et al., *supra*, (1991) *Cell* **65**, 175-187; Selbie et al., (1992) *Mol. Brain Res.* **13**, 159-163; Rouquier et al., (1998) *Nature Genet.* **18**, 243-50.; Issel-Tarver et al., (1997) *Genetics* **145**,  
15   185-195; Sullivan et al., (1996) *Proc. Natl. Acad. Sci. USA* **93**, 884-888; Nef et al., (1992) *Proc. Natl. Acad. Sci. USA* **89**, 8948-8952; Leibovici et al., (1996) *Dev. Biol.* **175**, 118-131; Freitag et al., (1995) *Neuron* **15**, 1383-1392; Ngai et al., (1993) *Cell* **72**, 657-666.

- 20           All of these receptors belong to the G protein-coupled receptor (GPCR) superfamily and share features of sequence and structure, such as seven hydrophobic transmembrane domains (7TM).

- The sense of smell plays an important role in mammalian social behavior, location of food and detection of predators. However, mammals vary in their olfactory ability. *See* Moulton (1967) *Am. Zool.* **7**, 421-429; Stoddart (1980) *The ecology of vertebrate olfaction* (Chapman and Hall, New York).

- 25           In primates, the sense of smell is greatly reduced (*i.e.*, microsmatic) with respect to other mammals such as dogs or rodents. *See* Moulton, *supra*; Stoddart, *supra*; Issel-Tarver, L., Rine, J. (1996) *Proc. Natl. Acad. Sci. USA* **93**, 10897-10902.

- Various explanations for the differences in olfactory performance have been hypothesized. Differences in the anatomical structures (size, location) devoted to olfaction  
30   could partly explain these differences. For example, dogs, which have an olfactory sensitivity up to 100 times greater than humans, have on average ~100 cm<sup>2</sup> of olfactory epithelium while

humans have only 10 cm<sup>2</sup>.

Variations in the size and diversity of the expressed ORX gene family could also account

for these differences. It has recently been demonstrated that the human ORX gene repertoire is distributed in over 25 chromosomal sites. Over 70% of these ORX genes are pseudogenes, *i.e.* the sequences have accumulated deleterious mutations such as in-frame stop codons and/or indel

frameshifts. *See Rouquier et al., (1998) Nature Genet. 18, 243-50.* Thus, the reduction of the sense of smell observed in primates could parallel the reduction of the number of functional ORX genes.

## SUMMARY OF THE INVENTION

The invention is based, in part, upon the discovery of novel polynucleotide sequences encoding novel polypeptides.

Accordingly, in one aspect, the invention provides an isolated nucleic acid molecule that includes the sequence an ORX nucleic acid molecule or a fragment, homolog, analog or derivative thereof. The nucleic acid can include, *e.g.*, a nucleic acid sequence encoding a polypeptide at least 80% identical to a polypeptide that includes the amino acid sequence of an ORX polypeptide. The nucleic acid can be, *e.g.*, a genomic DNA fragment, or a cDNA molecule.

Also included in the invention is a vector containing one or more of the nucleic acids described herein, and a cell containing the vectors or nucleic acids described herein.

The invention is also directed to host cells transformed with a vector comprising any of the nucleic acid molecules described above.

In another aspect, the invention includes a pharmaceutical composition that includes an ORX nucleic acid and a pharmaceutically acceptable carrier or diluent.

In a further aspect, the invention includes a substantially purified ORX polypeptide, *e.g.*, any of the ORX polypeptides encoded by an ORX nucleic acid, and fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition that includes an ORX polypeptide and a pharmaceutically acceptable carrier or diluent.

In still a further aspect, the invention provides an antibody that binds specifically to a ORX polypeptide. The antibody can be, *e.g.*, a monoclonal or polyclonal antibody, and fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition including ORX antibody and a pharmaceutically acceptable carrier or diluent. The invention is also directed to isolated antibodies that bind to an epitope on a polypeptide encoded by any of the nucleic acid molecules described above.

The invention also includes kits comprising any of the pharmaceutical compositions described above.

The invention further provides a method for producing an ORX polypeptide by providing a cell containing an ORX nucleic acid, *e.g.*, a vector that includes an ORX nucleic acid, and culturing the cell under conditions sufficient to express the ORX polypeptide encoded by the nucleic acid. The expressed ORX polypeptide is then recovered from the cell. Preferably, the cell produces little or no endogenous ORX polypeptide. The cell can be, *e.g.*, a prokaryotic cell or eukaryotic cell.

The invention is also directed to methods of identifying an ORX polypeptide or nucleic acid in a sample by contacting the sample with a compound that specifically binds to the polypeptide or nucleic acid, and detecting complex formation, if present.

The invention further provides methods of identifying a compound that modulates the activity of an ORX polypeptide by contacting an ORX polypeptide with a compound and determining whether the ORX polypeptide activity is modified.

The invention is also directed to compounds that modulate ORX polypeptide activity identified by contacting an ORX polypeptide with the compound and determining whether the compound modifies activity of the ORX polypeptide, binds to the ORX polypeptide, or binds to a nucleic acid molecule encoding an ORX polypeptide.

The invention also provides a method for assessing the olfactory acuity of a subject by providing a biological sample comprising nucleic acids from the subject, identifying a plurality of nucleic acid sequences homologous to an olfactory receptor nucleic acid sequence, determining the number of sequences containing open-reading frames, determining the number of sequences containing olfactory receptor pseudogenes, and comparing the number of open-reading frames to the number of pseudogenes to assess the olfactory acuity of the subject. In one embodiment, the invention provides a method of determining the plurality of nucleic acids

using a pair of primers that selectively amplify an olfactory receptor nucleic acid sequence. In a further embodiment, this pair of primers includes OR5B-OR3B (OR5B (TM2), 5'-CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3' (SEQ ID NO: 432) and 5'-AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ ID NO:433). In a still further embodiment, the ratio of the number of sequences containing open-reading frames to the number of sequences containing olfactory receptor pseudogenes is calculated and compared to a reference ratio for an organism whose olfactory acuity is known.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety. In the case of conflict, the present specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

Other features and advantages of the invention will be apparent from the following detailed description and claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic phylogeny tree of the primate species used in the Examples.

FIG. 2 is a comparison of the deduced protein ORX sequences obtained from the different primate species characterized. The dendogram was established using the PileUp program from the GCG Package. Percent amino acid similarity (ASI) was determined by pairwise sequence comparisons using the Gap program and is indicated along the abscissa of the tree. Sequences obtained from the literature are indicated by an asterisk. For example, human ORX sequences derived from the use of the OR3B/OR5B primers and representing the main ORX families were selected from Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. Dog (CfOLF1 and its human counterpart HsOLF1; CfOLF2) and chicken (COR4) sequences were selected from Issel-Tarver et al. (1997) *Genetics* 145, 185-195 and Leibovici et al., (1996) *Dev. Biol.* 175, 118-131, respectively. ORX families (greater than 40% ASI) are indicated by open circles and



subfamilies (greater than 60% ASI) are indicated by open squares. The main family was arbitrarily named family 1 and subdivided in two groups of subfamilies, 1-I and 1-II, which are indicated by ovals. Group 1-II further comprises subfamilies A and B. Beside each sequence name, black dots indicate sequences derived from the use of the OR3B/OR5B consensus primers, black squares those derived from the OR3.1/7.1 consensus primers, and black rectangles indicate potentially functional genes (uninterrupted ORFs). In the case of HSA 912-93 (black rectangle and double asterisk), the sequence contains only one nonsense point mutation in human, but potentially codes in other primates. *See Rouquier et al. (1998) Hum. Mol. Genet. 7, 1337-1345.* In FIG. 2, the following abbreviations are used: human, HSA; chimpanzee, PTR; gorilla, GGO; orangutan, PPY; gibbon, HLA; macaque, MSY; baboon, PPA; marmoset, CJA; squirrel-monkey, SSC and SBO; lemur, EFU and ERU; zebrafish, DRE.

## DETAILED DESCRIPTION OF THE INVENTION

Included in the invention are the novel nucleic acid sequences and their polypeptides. The sequences are collectively referred to as "ORX nucleic acids" or "ORX polynucleotides" and the corresponding encoded polypeptides are referred to as "ORX polypeptides" or "ORX proteins." Unless indicated otherwise, "ORX" is meant to refer to any of the novel sequences disclosed herein.

The ORX nucleic acids and polypeptides are described in more detail below.

### OR1

LOCUS AF127814 649 bp DNA PRI 28-FEB-2000  
 25 DEFINITION Papio hamadryas olfactory receptor (PPA13) gene, partial cds.  
 ACCESSION AF127814  
 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 30 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>649  
 /gene="PPA13"  
 10 CDS <1..>649  
 /gene="PPA13"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="WVDICFSTCIVPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILG  
 15 TLLLTVMAYDRFVA VCHPLHYITIMNPRLCGLLVFVTWLIGVMTSLLHISLMTHLTFC  
 KDFEIPHFCELTHTLQLACSDTFLNSTLIYVMTGVLGVFPLLGIIIFSYSRIASSIRK  
 MSSSGGKEKALSTCGSHLSVVSLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
 NO:2).  
 BASE COUNT 128 a 188 c 130 g 203 t  
 20 ORIGIN  
 1 ctgggttgac atctgttca gcacctgcat cgtccccaag atgctggtga acatccagac  
 61 caagaacaaa acgatttctt acatggactg cctcaccag gtctatttct ccatgtttt  
 121 tctattctg ggcacactac tctgaccgt gatggcctat gaccggttg tggcgtctg  
 181 ccacccctg cactatataa ccatcatgaa ccccgccctc tgtggcctcc tggttttgt  
 25 241 cagctggctc attggtgtca tgacgtccct cctccatatt tctctgatga cacatctaac  
 301 ctctgtgaaa gattttgaaa ttccacattt ttctgcgaa ctgacacata tctccagct  
 361 ggctgtctct gataccttc tgaacagcac gttgatatat gttatgacgg gtgtgctggg  
 421 cgttttccc ctcttggga tcattttctc ttattcacga atcgcttcat ccataaggaa  
 481 gatgtcctca tctgggggaa aagagaaagc actttctacc tgtgctctc acctctccgt  
 30 541 cgtttttta tttatggga caggcattgg ggtccacttc acttctcgg tgactcattc  
 601 ttccagaac atctcgtgg cctcgggtgat gtacacgggtg gttaccccc (SEQ ID NO:1).

## OR2

35 LOCUS AF127815 642 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas PPA14 pseudogene, partial sequence.  
 ACCESSION AF127815  
 KEYWORDS .  
 SOURCE baboon.  
 40 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 642)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 642)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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10 121 cgcatgtatg gaaagtctgc tctgggctg gatggcctat gaccggttg tggccatctg
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361 tagcctgctc tgacacataa catagtcgta tattttattg gtaccatatt tggttttct
15 421 cctctctcag ggatcctttt cttttactat aaaattgtt cctccattcc gagagttcgc
481 tctcaggta ggaagtataa agccttctcc acctgcagct ctcaccttc agttgtttgc
541 ttattttatg gaacagccct tggagggtac ctcagttcag ctgtctctc cccccccagg
601 aagggtgcag cggcctcagt gatgtacatg gtggtcacc cc (SEQ ID NO:3).

20 OR3

LOCUS AF127816 649 bp DNA PRI 28-FEB-2000
DEFINITION Papio hamadryas olfactory receptor (PPA15) gene, partial cds.
ACCESSION AF127816
25 KEYWORDS .
SOURCE baboon.
ORGANISM Papio hamadryas
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;
30 Papio.
REFERENCE 1 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
35 JOURNAL Unpublished
REFERENCE 2 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
40 Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
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/ gene="PPA15"
CDS <1..>649
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KDFEIPHFFCELTHILQLACSDTFLNSTLIYVMTGVLGVFPLLGIIIFSYSRIASSIRK
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55 NO:5).
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BASE COUNT 130 a 188 c 128 g 203 t  
ORIGIN

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121 tcctattctg gacacactac tctgaccgt gatggcctat gaccggttg tggcgcgtctg  
181 ccacccccctg cactatataa ccatcatgaa cccccgcctc tgtggcctcc tggttttgt  
241 cacgtggctc attggtgtca tgacatccct cctccatatt tctctgatga cacatctaac  
301 cttctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacata tctccagct  
10 361 ggctgctct gataccttcc tgaacagcac gttgatatat gttatgacgg gtgtgctggg  
421 cgttttccc ctccttggga tcattttctc ttattcacga atcgcttcat ccataaggaa  
481 gatgtctca tctgggggaa aagagaaagc actttctacc tgtggctctc acctctccgt  
541 cgtttcttta ttatggga caggcattgg ggtccacttc acttctgcgg tgactcattc  
601 ttcccagaac atctccgtgg cctcggtgat gtacacggtg gttaccccc (SEQ ID NO:4).

## 15 OR4

LOCUS AF127817 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA16) gene, partial cds.  
ACCESSION AF127817

## 20 KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
25 Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

30 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

35 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

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CDS <1..>649

/gene="PPA16"

/codon\_start=2

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IKMEIPHFFCDLPEVLKLACSDTFINNVVIYFATGILAVIPFTGILFSYYKIVFSVLR

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50 NO:7).

BASE COUNT 130 a 176 c 136 g 207 t

ORIGIN

1 ctgggtgac atctgttca gcacctgcat cgtccccaag atgctggtga acatccagac  
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121 tcctattctg gacacactac tctgaccgt gatggcctat gaccggttg tggccatcta

181 tcactccctg cactacacgg tcatcatgag ccccccggctc tgggactgc tggttctggg  
 241 atcctgtgac atcagtgtca tgggttccct gcttgagacc ttgactgtt tgaggctgac  
 301 cttctgcatc aaatggaaa ttccacactt ttttgtgat ctctctgaag tcctgaagct  
 361 cgcctgttct gacaccttca tcaataatgt agtgatatac ttgcaactg gcattctggc  
 421 tgtgattccc ttactggaa tactttctc ttactataaa attgtttct ctgtactgag  
 481 gatttctca gctgggggaa agtacaaagc ctttccacc tgggttccc accttcaat  
 541 ggtcagcttg ttctatggca cgggccttgg ggtctatctc agttctgcag ctataccatc  
 601 ttctaggaca agtctgggg cctcagtgat gtacacatg gtcaccccc (SEQ ID NO:6).

## 10 OR5

LOCUS AF127818 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA41) gene, partial cds.  
 ACCESSION AF127818

## 15 KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

20 Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

25 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

30 FEATURES Location/Qualifiers

source 1..649

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CDS <1..>649

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/translation="WVDICFSTCIVPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD

TLLLTVMAYDRFVAVCHPLHYITIMNPRLCGLLVFTWLIGVMTSLHISLMTHLTFC

KDFEIPHFCELTILQLACSDTFLNSTLIYVMTGVLGVFPLLGIIFSYSRIASSIRK

MSSSGGKEKALSTCGSHLSVVSFLYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID

45 NO:9).

BASE COUNT 130 a 188 c 128 g 203 t

ORIGIN

1 ctgggtgac atctgttca gcacctgcat cgtccccaag atgctggtga acatccagac  
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 121 tctattctg gacacactac tctgaccgt gatggcctat gaccggttg tggccgtctg  
 181 ccccccttg cactatataa ccatcatgaa cccccgcctc tgggctcc tggttttgt  
 241 cagtggtgc attggtgtca tgacatccct cctccatatt tctctgatga cacatctaac  
 301 cttctgaaa gatttgaaa ttccacattt ttctgcgaa ctgacacata tectccagct  
 361 ggctgctct gataccctcc tgaacagcac gttgatatat gttatgacgg gtgtgctggg  
 55 421 cgttttccc ctcttggga tcatttctc ttattcagca atcgctcat ccataaggaa

481 gatgtcctca tctgggggaa aagagaaagc accttctacc tgtggctctc acctctccgt  
 541 cgtttcttta ttatatggga caggcattgg ggtccacttc acttctgcgg tgactcattc  
 601 ttcccagaac atctccgtgg cctcggatgt gtacacgggtg gttaccccc (SEQ ID NO:8).

## 5 OR6

LOCUS AF127819 649 bp DNA PRI 28-FEB-2000

DEFINITION Papio hamadryas olfactory receptor (PPA42) gene, partial cds.

ACCESSION AF127819

10 KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

15 Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

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/db\_xref="taxon:9557"

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/gene="PPA42"

CDS <1..>649

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/codon\_start=2

35 /product="olfactory receptor"

/translation="LVDFCLATNTIPKMLVSLQTRSKAISYPCCLTQMYFFHFFGIVD

SIHIMMAYDRFVAICHPLHYATIMSPRLCGLLVGVPWAFSCFISLTHILLMARLVFC

GSHEVPHYFCDLTPILRLSCTDTSVNRIFILIVAGMVIATPFCILASYARILAAIMK

VPSAGGRKKAFSTCSSHLSVVALFYGTTIGVYLCPSVVRTAVKEKASAVMYTAVTP" (SEQ

40 ID NO:11).

BASE COUNT 111 a 224 c 146 g 168 t

ORIGIN

1 cctggttgat ttctgtctgg ccaccaacac catcccaag atgctggtga gccttcaaac

61 caggagcaag gccatctctt atccctgctg cctgaccag atgtacttct tccatttctt

45 121 cggcatcgtg gacagcatca taatgccat gatggcttat gaccggttcg tggccatctg

181 ccaccggtg cactacgcca cgatcatgag cccacgcctc tgtggtctgc tggcggcgt

241 cccctgggcg ttctctgct tcatctctct caccacatc ctctgatgg cccgcctcgt

301 ttctgcggc agccacgagg tgcctcacta ctctgcgac ctactccca tctccgact

361 ttctgcaca gacacatcag tgaacaggat ctctatctc attgtggcag ggatggtgat

50 421 agccacgccc ttcatctgca tcttggttc ctatgtcgc atccttggc ccatcatgaa

481 ggtcccctct gcaggcggca ggaagaaagc ctctccacc tgcagctccc acctgtctgt

541 ggtgtctctc ttctatggga ccaccattgg tctctatctg tctccctct cgttccgcac

601 ggctgtgaag gagaagcctt ctgccgtgat gtacacagca gtcaccccc (SEQ ID NO:10).

## 55 OR7

LOCUS AF127820 641 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas PPA43 pseudogene, partial sequence.  
 ACCESSION AF127820  
 5 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 10 Papio.  
 REFERENCE 1 (bases 1 to 641)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 15 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 641)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 20 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..641  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 25 gene <1..>641  
 /gene="PPA43"  
 /pseudo  
 BASE COUNT 126 a 172 c 123 g 220 t  
 ORIGIN  
 30 1 cttgcctgac atcagtttca ccttgcccat ggtcccaag atgattgtgg acatgcaatc  
 61 gcatagcaga gtcattccc acgcgactg cctggcacag atgtcttct ttgcctttt  
 121 tgcattgata gatgacatgc tctgactgt gatggcctat aactgatttg tggccatctg  
 181 tcacccctcg cactaccag tcattcatgaa tctcacttc tgtgtctct tagttttgt  
 241 gtcttttcg tcagcgtgtt ggattccag ctgcacaatt tgattgtgtt acaactacc  
 35 301 tgcttcaatg atgtggaaat ctctaaatt ttctgtgacc ctctcaact tctcaatcct  
 361 agcctgctct gacacataac atagtcgtat attttattgg taccatattt ggtttcttc  
 421 ctctctcagg gatccttttc ttctactata aaattgttgc ctccattccg agagtgcgt  
 481 cttcaggtag gaagtataaa gccttctcca cctgcagctc tcaccttca gttgtttgct  
 541 tattttatgg aacagccctt ggagggtacc tcagttcagc tgtctctct cccccagga  
 40 601 aggggtgcagc ggctcagtg atgtacatgg tggtcacccc c (SEQ ID NO:12).

## OR8

LOCUS AF127821 649 bp DNA PRI 28-FEB-2000  
 45 DEFINITION Papio hamadryas olfactory receptor (PPA68) gene, partial cds.  
 ACCESSION AF127821  
 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE The olfactory gene repertoire in primates and mouse: evidence for

reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
10 /organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>649  
/gene="PPA68"  
CDS <1..>649  
15 /gene="PPA68"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FIDVCFVSTTVPKMLVNIQTQSRVITYAGCITQMCFFIFFAGLD  
IFMLTVMAYDRFVAICHPLHYTVTMNPRCLGLLVLASWIMSALNSSLQSLMVLHLSFC  
20 ADLEIPHFFCELNQVVHLACSDTFLNDMVMYLASALLGGGALSILYSYSKIVSSIRG  
TSSAQGKYKAFSTCASHLSVVSFLFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ  
ID NO:14).  
BASE COUNT 122 a 177 c 146 g 204 t  
ORIGIN  
25 1 cttcatagac gtctgttttg tgtccaccac tgtccgaag atgctggtga acatccagac  
61 acagagcaga gtcacacct atgcaggctg catcaccag atgtgcttt tcatattctt  
121 tgcgggactg gatatcttta tgctgaccgt gatggcctat gacaggtttg tggccatctg  
181 tcacccctcg cactacacgg tcaccatgaa cccaggctc tgtggactgc tggttctggc  
241 gtcctggatc atgagtgcc tgaattcttc gttgcaaagc ttaatggtat tgcacctttc  
30 301 cttctgtgca gacttggaaa ttcccactt tttctgtgaa cttaatcagg tggccacct  
361 tgctgttct gacaccttc ttaatgacat ggtgatgtat ttggcatctg cgctgtggtg  
421 cggtggtgcc ctcttgga tctttattc ttattctaag atcgtttcct ccatacgtgg  
481 aacctcgta gtcaggga agtacaaggc atttccacc tgtgcatctc acctctcgg  
541 tgtctccta tttatggta cgctcctagg agtgtactt agttctgtg caaccgtaa  
35 601 ctcacacta agtgtgcag cctcgggat gtacactgtg gttaccccc (SEQ ID NO:13).

## OR9

LOCUS AF127822 649 bp DNA PRI 28-FEB-2000  
40 DEFINITION Papio hamadryas olfactory receptor (PPA72) gene, partial cds.  
ACCESSION AF127822  
KEYWORDS .  
SOURCE baboon.  
ORGANISM Papio hamadryas  
45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
55 TITLE Direct Submission



JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..649  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"

gene <1..>649  
/gene="PPA72"

10 CDS <1..>649  
/gene="PPA72"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FIDICFVSTTVPKMLVNIQTQSRVITYAGCITQMCFFIFFAGLD  
IFMLTVMAFDRFVAICHPLHYTVTMNPKLCGLLVLASWIMNALNSSLQSLIVLRLSFC  
15 TDLEIPHFCELNQVVHLACSDTFNLNDMGMYMASALLGGGALSGILYSYKILSSIRG  
TSSAQGKYKAFSTCASHLSVVSLFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ

ID NO:16).

BASE COUNT 124 a 179 c 144 g 202 t

ORIGIN

20 1 cttcatagac atctgttttg tgtccaccac tgtcccgaag atgctggtga acatccagac  
61 acagagcaga gtcacacct atgcaggctg catcaccag atgtgctttt tcatattctt  
121 tgcgggactg gatatcttta tgctgaccgt gatggccttt gaccggtttg tggccatctg  
181 tcacccctcg cactacacgg tcaccatgaa cccaagctc tgtgggctgc tggttctggc  
241 gtctctgcat atgaatgcc tgaattcctc gttacaaagc ttaatagtgc tgcggcttgc  
25 301 cttctgcaca gacttggaat tccccactt ttctgtgaa cttaatcagg tggccacac  
361 tgcctgttct gacaccttgc ttaatgacat ggggatgtat atggcatctg ctctctctggg  
421 cggtgtgtcc ctctctggga tcctttatc ttattctaag atccttctc ccatacgtgg  
481 aacctcgtca gctcagggga agtacaaggc atttccacc tgtgcattc acctctcggt  
541 tgtctcttta tttatggta cgctcctagg agtgtacttt agttctgtg caactcgtaa  
30 601 ctcacactca agtgctgcag cctcggtgat gtacacgggt gttaccccc (SEQ ID NO:15).

## OR10

LOCUS AF127823 649 bp DNA PRI 28-FEB-2000

35 DEFINITION Papio hamadryas olfactory receptor (PPA79) gene, partial cds.  
ACCESSION AF127823  
KEYWORDS .  
SOURCE baboon.  
ORGANISM Papio hamadryas  
40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
55 /organism="Papio hamadryas"

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5      /db_xref="taxon:9557"
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            /gene="PPA79"
      CDS      <1..>649
            /gene="PPA79"
            /codon_start=2
            /product="olfactory receptor"
            /translation="LVDVSYATSIVPQLLAHFLAEHKAISLQSCAAQLFFSLALGGIE
10      FVLLAVMAYDRYVAVCDPLRYSATMHGALCAKLAIWSVSGSINSLMHTTITFQLPMC
      TNKFINHIFCEILAVIRLACVDTSNEVTIMVSSIVLLMTPLCLVLLSYIRIISTILK
      IQSREGRRKAFHTCASHLTVVALCYGMAIFTYIHPHSSPSVLQEKLISLFYAILTP" (SEQ ID
      NO:18).
      BASE COUNT   135 a   185 c   133 g   196 t
      ORIGIN
15      1 cctgtcgat gtctcctatg ccacaagcat agtcctcag ctgctggcac attttctgc
      61 agaacataaa gccatctcgt tgcagagctg tgcagccaa ttattttct ccctggcctt
      121 ggggtggatt gagttgttc tcctggcagt gatggcctat gaccgctatg tggctgtgtg
      181 tgacccctg cgtactcag ccaccatgca tggagcgcta tgtgctaagt tggccatcac
      241 atcctgggtg agtggatcca ttaactctct catgcatacc accatcaact ttcagctgcc
20      301 catgtgcaca aacaagtta ttaatcata atctgtgaa atttagctg tgcaggct
      361 ggcttgtgtg gacacctct ccaacgaggt caccatcatg gtgtctgca ttgttctct
      421 gatgacacc ttatgtctgg ttctttgtc ttacatccgg atcatccea ccatcttaa
      481 gatccagtc agagaaggaa ggaggaaagc ctccacacg tgtgcctctc acctcacagt
      541 gggtgccctg tgctatggca tggccattt cacttacatc catcccaact ccagtcctc
25      601 tgccttcag gagaagtga tctctctt ttatgccatt ttgacacca (SEQ ID NO:17).

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## OR11

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30      LOCUS   AF127824   649 bp   DNA       PRI    28-FEB-2000
      DEFINITION Pan troglodytes olfactory receptor (PTR12) gene, partial cds.
      ACCESSION AF127824
      KEYWORDS
      SOURCE   chimpanzee.
      ORGANISM Pan troglodytes
35      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
      Eutheria; Primates; Catarrhini; Hominidae; Pan.
      REFERENCE 1 (bases 1 to 649)
      AUTHORS   Giorgi,D.G. and Rouquier,S.P.
      TITLE     The olfactory gene repertoire in primates and mouse: evidence for
40      reduction of function in primates
      JOURNAL   Unpublished
      REFERENCE 2 (bases 1 to 649)
      AUTHORS   Giorgi,D.G. and Rouquier,S.P.
      TITLE     Direct Submission
45      JOURNAL   Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
      Montpellier Cedex 5 34396, France
      FEATURES   Location/Qualifiers
      source     1..649
            /organism="Pan troglodytes"
50      /db_xref="taxon:9598"
      gene      <1..>649
            /gene="PTR12"
      CDS      <1..>649
            /gene="PTR12"
55      /codon_start=2

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                    /product="olfactory receptor"
                    /translation="FLEIGFNLVIVPKMLGTLAQD TTISFLGCATQMYFFFFFGVAE
CFLLATVAYDRYVAICSPLHYPVIMNQTRAKLAAASWFGFPVATVQTTWLFSPFC
RTNKNVNHFFCDSPPVLR LVCADTALFEIYAIVGTILVVMIPCLLILCSYTRIAAAILK
5      IPSAKGKNKAFSTRSSHLLVVS LFYISLSLT YFRPKSNNSPEGKKLLSLSYTMTP" (SEQ ID
NO:20).
BASE COUNT   132 a   193 c   129 g   195 t
ORIGIN
1      1 ttctcggag attggcttca acctagtcac tgtgcccaaa atgctgggga ccctgcttgc
10     61 ccaggacaca accatctcct tccttggctg tggcactcag atgtatttct tcttcttct
121 tggagttgct gaatgcttcc tcctggctac cgtggcatat gaccgctatg tggccatctg
181 cagtccttg cactaccag tcacatgaa ccaaaggaca cgggccaaac tggctgctgc
241 ctctggttc ccaggcttcc ctgtagctac tgtgcagacc acatgctctc tcagttttcc
301 attctgtgc accaacaagg tgaaccactt ctctgtgac agcccactg tctgaggct
15     361 ggtctgtgca gacacagcac tgttgagat ctacgccatc gtcggaacca ttctggtggt
421 catgatcccc tgctgtctga tctgtgttc ctatactcgc attgctgctg ccatactcaa
481 gatccatca gctaaaggga agaataaagc cttttctaca cgttctcac acctcttgc
541 tgtctctt tctatatat catgaagcct cacatatatt cggcctaaat caataattc
601 tcctgagggc aagaagctgc tatcgtgtgc ctacactgtt atgactccc (SEQ ID NO:19).
20
OR12

LOCUS   AF127825   650 bp   DNA       PRI    28-FEB-2000
DEFINITION   Pan troglodytes PTR2 pseudogene, partial sequence.
25     ACCESSION   AF127825
KEYWORDS
SOURCE     chimpanzee.
ORGANISM   Pan troglodytes
          Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
30     Eutheria; Primates; Catarrhini; Hominidae; Pan.
REFERENCE   1 (bases 1 to 650)
AUTHORS     Giorgi,D.G. and Rouquier,S.P.
TITLE       The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
35     JOURNAL     Unpublished
REFERENCE   2 (bases 1 to 650)
AUTHORS     Giorgi,D.G. and Rouquier,S.P.
TITLE       Direct Submission
JOURNAL     Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
40     Montpellier Cedex 5 34396, France
FEATURES             Location/Qualifiers
          source           1..650
                        /organism="Pan troglodytes"
                        /db_xref="taxon:9598"
45     gene             <1..>650
                        /gene="PTR2"
                        /pseudo
BASE COUNT   127 a   202 c   131 g   190 t
ORIGIN
50     1 ctttgggac atctgcttct cctccaccac cgtccccaag atgctggcca atcacatact
61 cgggactcag accatctcct tctgtggctg ttccacacag atgtatttgc ttttcatgct
121 tgtggacatg gacaatttcc tcctagctgt gatggcctat gaccgcttgc tcgccgtgtg
181 ccaccctta cattacacag caaagatgac ccacagctc tgtgccctgc tggttgctgg
241 attatgggtg gttgccaacc tgaatgtcct tctgcacacc ctgctgatgg ctgcactctc
55     301 attctgtgca gacaatgccca tccctcactt ctctgcgat gtgactcccc tactgaaact

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361 ctctgtctca gacacacacc tcaatgaggt cataatcctt agtgagggtg ccctgggtcat  
 421 gatcacccca ttctttgca tcctggcctc ttatatgcac atcacctgca ctgtcctgag  
 481 ggcccatcc acaaaggga ggtgtaagc ctctccacc tgggctctc acctggctgt  
 541 ggttctacat ctctatggc accatcattg ctgtgtattt taacctctg tctccact  
 5 601 cagcagagaa agacactacg gctactgtgt gtatacagt agtgactccc (SEQ ID NO:21).

### OR13

LOCUS AF127826 649 bp DNA PRI 28-FEB-2000  
 10 DEFINITION Pan troglodytes PTR3 pseudogene, partial sequence.  
 ACCESSION AF127826  
 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 20 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
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 /organism="Pan troglodytes"  
 30 /db\_xref="taxon:9598"  
 gene <1..>649  
 /gene="PTR3"  
 /pseudo  
 BASE COUNT 146 a 166 c 121 g 216 t  
 35 ORIGIN

1 ctttgtgat ttctgttatt ccaccacagt tacacccaaa ctgctggaga acttggtgt  
 61 ggaagacaga accatctcct tcacaggatg catcatgcaa ttcttctgg cgtgtatatg  
 121 tgcagtgga gaaacattca tgcaggcagt gatggcctat gattgatac tggcagtggt  
 181 taaccctttg ctctacacag ttgtcaggtc ccagaaactc tgtgcatcat tagtggcagg  
 40 241 gccctacaca tggggataaa tctcttctc gacactcacc tatttctct tgcattatc  
 301 cttctgtggg tctaactca tcaataattt tgtctgtgag gactctgtca tcatctctgt  
 361 ctctgtctc gaccctaca tcagccaaat gctttgttt gtcattgcaa tattcaatga  
 421 ggtgagcagc ttgggagtca tctcactac ctatatctt atctttattg ctgtcataaa  
 481 aatgccttct gctgttgggc accaaaaagc ttctctacc tgtcttccc acctgactgc  
 45 541 catcactatt ttccatggga ctgtcctgtt cctttattgt gtaccaact ccaaaaactc  
 601 atggctcata gtcaaagtag gttctgtgtt ttatacagtc atcatcccc (SEQ ID NO:22).

### OR14

50 LOCUS AF127827 651 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR4 pseudogene, partial sequence.  
 ACCESSION AF127827  
 KEYWORDS .  
 SOURCE chimpanzee.  
 55 ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 651)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 651)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
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15 /organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>651  
/gene="PTR4"  
/pseudo

20 BASE COUNT 131 a 166 c 134 g 220 t  
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61 tcacagcaga gtcattcct atgcaggctg cctgactcag atgtctctt ttgccattt  
121 tggaggatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca  
25 181 tctgtcacct atatcgttca gccatcttta acccgtgtt ctgtggcttc ctgatttgt  
241 tgtcttttt tttttctca gtcttcaga ctcccagctg cacaactga ttgccttaca  
301 aatgacctgc tcaaggatg tggaaattcc taattcttc tgggaacctt ctcaactctc  
361 ccattcttga tttgtgaca ccttcaccag gaacatcagt attccctgc tgccatatt  
421 gggtttctc ctatctcaca gatcatttc tcttactata aaattgttc ctccatgctg  
30 481 agtgtttcat catcagggtg gaagtataaa gccttctcca actgtgggtc tcccctgtca  
541 gttgtttgct tattttatgg gaaaggcatt ggggggtacc tgagttcaga tgtgtcatct  
601 tccccagaa aggtgtcagt ggccctcagt atgtacacgg tgatcacgc c (SEQ ID NO:23).

**OR15**

35 LOCUS AF127828 657 bp DNA PRI 28-FEB-2000  
DEFINITION Pan troglodytes PTR5 pseudogene, partial sequence.  
ACCESSION AF127828  
KEYWORDS .

40 SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 657)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 657)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
55 source 1..657



421 cctatttggg ttcttccca tctcggggac ccttttctct tactgtaaaa ttgttctc  
 481 cattctgagg gtctcatcat cagggtgggaa gtataaacct tctccactg tgggtctcac  
 541 ctgtcagttt ttgtctgatt ttatggaaaa ggcgttggag ggtacctag ttcagatgtg  
 601 tcattctccc tgagaaaggc tgcagtggcc tcagtgatgt acaagatggt cactccc (SEQ ID NO:25).

## OR17

LOCUS AF127830 650 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR7 pseudogene, partial sequence.  
 ACCESSION AF127830  
 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..650  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene <1..>650  
 /gene="PTR7"  
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 BASE COUNT 122 a 168 c 127 g 233 t

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 61 tcacagtaga ctcatctctt acgtaggctg cctgactcag atgtctttt tgatcctttt  
 121 cgcagtatg gaaagtctgc tctgattgt gatggcctat gaccggctcg tgaccatctg  
 181 tcacccctg cactaccaag tcatcatgag cccacgactc tgtgcttct tagttttggt  
 241 gtctttttt cttagccttt tggactctca gctgcacaa ttgattgtgt tacaacttac  
 301 ctgcttcaac gatgtagaaa tctctaatt tttctgtga ccttcttaa ctctcaacc  
 361 tggcctgttc tgacacctcc attaataaca tgggtgtata tttaattggt gccatatttg  
 421 gttttctccc tctctaggg atccttttct ctactataa aattgttcc tccattctga  
 481 gatttctctc ttcaggtggg aagtataaag ccttctccac ctgcagctct cactgtcag  
 541 ttgttgctt attttatgga acagcccttg gagggtaact cagtcagct gtgtccctt  
 601 cctccaggaa ggggtcagtg gcctcagtga tgtacatggt ggtcaccccc (SEQ ID NO:26).

## OR18

LOCUS AF127831 663 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR8 pseudogene, partial sequence.  
 ACCESSION AF127831  
 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 663)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 5 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 663)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..663  
 /organism="Pan troglodytes"  
 15 /db\_xref="taxon:9598"  
 gene <1..>663  
 /gene="PTR8"  
 /pseudo  
 BASE COUNT 129 a 171 c 139 g 224 t  
 20 ORIGIN  
 1 cttgectgac atcggtttca cctccaccac ggtccccaag atgattgtgg acatccagtc  
 61 tcacagcaga gtcatttct atgcaggctg cctgactcag atgtctctct ttgccatttt  
 121 tggaggcatg gaagagagac atgctcctga atgtgacggc ctatgaccgg ttgtagcca  
 181 tctgtcacc tctatcgt tcagccatct tgaaccggtg ttctgtggc ttctaggtt  
 25 241 tttgtcttt gattttttt ttttctcag tcttttagac tcccagctgc acaacttgat  
 301 tgccttaca atgacctgct tcaaggatgt ggaaattcct aatttcttcc gggaaccttc  
 361 tcaactcccc catcttgcat gttgtgacac cttcactagg aacatcaaca tgtattttct  
 421 tgetgccata ttgggtttc ttcccatctc ggggaccctt ttcttact gtaaaattgt  
 481 ttctccatt ctgagggtt catcatcagg tgggaagtat aaaccttcac cacttggtgg  
 30 541 tctacctgt cagttgttg ctgatttat ggaacaggcg ttggagggtg cctcggttca  
 601 gatgtgtcat ctccccgag aaagggtgca gtggcctcag tgatgtacac ggtggtcacc  
 661 ccc (SEQ ID NO:27).

**OR19**

35 LOCUS AF127832 677 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR9 pseudogene, partial sequence.  
 ACCESSION AF127832  
 KEYWORDS .  
 40 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 677)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 677)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 55 source 1..677



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                    /db_xref="taxon:9598"
gene      <1..>677
                    /gene="PTR9"
5          /pseudo
BASE COUNT  129 a  170 c  143 g  235 t
ORIGIN
1  cttgactgac atcggtttca cctccatcac agtccccaag atgattgtgg acatctagtc
10 61 tcacagcaga gtcactgct atgcagggtg cctgactcag atgtctctct ttgccatttt
121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatggccgg ttgtagcca
181 tctgtcaccc tccatctgt tcagccattt tgaaccctg tttctgtggc ttctagatt
241 tgtgtcctt gttttttt gttttttt gtttttct caggctttta gactcccgac
301 tgcacaactt gattgcctta caaatgacgt gttcaagga tgtggaaatt cctaatttct
15 361 tctgggaacc ttctcaactc gcccatcttg catgtttaa cacctcacc aggaatatca
421 acctgtatt cctgctgcc gtatttggtt ttctcccat ctgggggacc cttttctct
481 actgtaaaat tgttctcc atctgaagg ttcatcatc aggtgggaac tataaagcct
541 tctccacctg tgggtctcac ctgtcagtg ttgcttatt ttatggaaca ggcgttgag
601 ggtacctcag tcagatgtg tcattctccc ccagaaaggg tgcagtggcc tcagtgatgt
20 661 acacgggtgt caccccc (SEQ ID NO:28).

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## OR20

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LOCUS  AF127833  643 bp  DNA      PRI    28-FEB-2000
DEFINITION  Hylobates lar HLA45 pseudogene, partial sequence.
25  ACCESSION  AF127833
KEYWORDS
SOURCE  common gibbon.
ORGANISM  Hylobates lar
          Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
30  Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.
REFERENCE  1 (bases 1 to 643)
AUTHORS  Giorgi,D.G. and Rouquier,S.P.
TITLE    The olfactory gene repertoire in primates and mouse: evidence for
          reduction of function in primates
35  JOURNAL  Unpublished
REFERENCE  2 (bases 1 to 643)
AUTHORS  Giorgi,D.G. and Rouquier,S.P.
TITLE    Direct Submission
JOURNAL  Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
40  Montpellier Cedex 5 34396, France
FEATURES             Location/Qualifiers
     source          1..643
                     /organism="Hylobates lar"
                     /db_xref="taxon:9580"
45  gene            <1..>643
                     /gene="HLA45"
                     /pseudo
BASE COUNT  131 a  168 c  127 g  217 t
ORIGIN
50 1  ctgggctgac atcactttca cctcgcccat ggttcccaag atggttgtgg acatgcagtc
61 gcatagcaga gccatctctt atgcaggctg cctgacacag atgtcttctt ttgtcctttt
121 gcatgtatag aagacatgct cctgactctg atggcctatg accgatttgt ggccatctgt
181 caccctctgc actaccagct catcgtgaat cctcacctct gtgtcttctt agttttgttg
241 tctttttccc ttagcctgtt ggattccag ctacacagct ggattgtgtt tacaattcac
55 301 cttctcaag aatggaaatc tctaattttt tctgtgacct gtctcaactt ctcaaccttg

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361 cctgttctga cagcatcatc gataacatat tatatatatta gatagcccta tatttggtt  
 421 tcttccatt tcagggatcc tttgtctta gtataaaatt gtctcccca ttccgagaat  
 481 tccatcatca gatgggaagt ataaagcctt ctccacctgt ggctctcacc tggcagttgt  
 541 tgcattttat gaaacaggca ttggcgtgta cctgacttca gctgtgtcat catccccag  
 5 601 gaatggtgtg gtggcgtcag tgatgtatgc tgtgttcacc ccc (SEQ ID NO:29).

## OR21

LOCUS AF127834 648 bp DNA PRI 28-FEB-2000  
 10 DEFINITION Hylobates lar HLA46 pseudogene, partial sequence.  
 ACCESSION AF127834  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 20 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..648  
 /organism="Hylobates lar"  
 30 /db\_xref="taxon:9580"  
 gene <1..>648  
 /gene="HLA46"  
 /pseudo  
 BASE COUNT 131 a 170 c 143 g 204 t  
 35 ORIGIN  
 1 ctgtgtcgac atctgttca cctccaccac gatgccaag atgttggtga acatccagge  
 61 acagactcaa tccatcagtt acacaggctg cctcaccaa atctgctttg tcttggttt  
 121 tgttgattg gaaaatggaa ttctgtgtcat gatggcctat gatcgatttg tggccatctg  
 181 tcaccactg aggtacaatg tcatcatgaa cccaaactct gtgggctgct gcttctgctc  
 40 241 tcttcatca ttagtgtcct ggacgctctg ctgcacacgt tgatggtgct acggctgacc  
 301 ttctgcacag acctggaaat tccccacttt ttctgtgaac tagctcatgt tctcaagctc  
 361 gcctgttctg atgtcctcat taataacatc ctggtgtatt tggtgaccgg cctgttaggt  
 421 gttgttcctc actctgggat cattttctct tacacacgaa ttgcctcctc tgtcatgaaa  
 481 attccattag ctggtggaaa gtataaagct tttccatct gcgggtcaca cttaatcgtc  
 45 541 gtttgctgt tctatgaac agggtttggg gtgtacctta gttctggggc taccactcc  
 601 tctaggcagg gtgcaatagc atcagtgtg tataccgtgg tcaccccc (SEQ ID NO:30).

## OR22

LOCUS AF127835 660 bp DNA PRI 28-FEB-2000  
 50 DEFINITION Hylobates lar HLA47 pseudogene, partial sequence.  
 ACCESSION AF127835  
 KEYWORDS .  
 SOURCE common gibbon.  
 55 ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 660)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 660)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..660  
15 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>660  
/gene="HLA47"  
/pseudo

20 BASE COUNT 127 a 182 c 137 g 214 t  
ORIGIN  
1 ctgcctgac atcggttca ctccaccac agtccccaag attattgtgg acatcaaadc  
61 tcacagcaga gtcattcct aggcaggctg cctgactcag acctctctct ttgccatttt  
121 tggaggcatg gaagagagac acgctcctga gtgtgatggc ctatgaccgg ttgtagcca  
25 181 tctgtcacc tctatatcat tcggccatga tgaaccctg tttctgcggc ttctagttt  
241 tgtgtcttt ttttttct tctcagtct ctgactccc agctgcacaa ctgattgcc  
301 ttgtaacga cctgcttcaa gggcgaggaa attcctaatt tctctgtga ccttctcaa  
361 ctcccccatc ttgcatgttg tgacacctc accaataaca taatcatgta ttttctgct  
421 gccgtatttg ggttccttcc catctcgggg acccttctct ctactataa aatggtttcc  
30 481 tccattctga ggttctcatc gtcagggtgg aagtataaag ccttctccac ctgtgggtct  
541 catctgtag ttgtttctg agttatgga agaggcgtg gaggatacct cagttcagat  
601 gtgtctctt cccccagaaa ggttgcatg gcctcagtga tgtacacggt ggtcaccccc (SEQ ID NO:31).

**OR23**

35 LOCUS AF127836 649 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar olfactory receptor (HLA48) gene, partial cds.  
ACCESSION AF127836  
KEYWORDS .

40 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 649)  
45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

55 FEATURES Location/Qualifiers  
source 1..649

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/organism="Hylobates lar"
/db_xref="taxon:9580"
gene <1..>649
/ gene="HLA48"
5 CDS <1..>649
/ gene="HLA48"
/ codon_start=2
/ product="olfactory receptor"
/ translation="WVDICFGTCIIPKMLVNIQTKNKAISYMDCLTQVYFSMLFPILD
10 TLLLTVMAYDRFVAICHPLHYMIIMNPRLCGLLIFVIWLIGVMTSLLHISLMMHLIFC
KDFEIPHFCELTHILQLARSDTFLNSTLIYFMTGVLGVFPLLGIIFSYSRIASSIRK
MSSSGGKQKALSTCGSHLSVVSFLFYGTGIGVHFTSAVTHASQKISVASVMYTVVTP" (SEQ
ID NO:33).
BASE COUNT 133 a 190 c 124 g 202 t
15 ORIGIN
1 ctgggtgac atctgttcg gcacttgcac catccccaag atgctggtga acatccagac
61 caagaacaaa gccatctcct acatggactg cctcacacag gtctatttct ccatgctttt
121 tcctattctg gacacgtac tcctgaccgt gatggcctat gaccggttg tgcccatctg
181 ccaccctctg cactacatga tcacatgaa ccccccgcctc tgtggcctcc tgattttgt
20 241 catctggctc attggtgtca tgacatccct cctccatatt tcctgatga tgcactaat
301 ctctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacaca tcctccagct
361 ggcccgctct gataccttcc tgaacagcac gtgatatac ttatgacag gtgtgctggg
421 cgtttttccc ctcttggga tcattttctc ttattcacga attgcttcat ccataaggaa
481 gatgtccta tctgggggaa aacaaaaagc acttccacc tgtgggtctc acctctccgt
25 541 tgtttcttta tttatggga caggcattgg ggtccacttc acttctgcag tgactcacgc
601 ttccagaaa atctcgtgg cctcggatgt gtacactgtg gtcacccc (SEQ ID NO:32).

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## OR24

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30 LOCUS AF127837 649 bp DNA PRI 28-FEB-2000
DEFINITION Hylobates lar olfactory receptor (HLA5) gene, partial cds.
ACCESSION AF127837
KEYWORDS .
SOURCE common gibbon.
35 ORGANISM Hylobates lar
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.
REFERENCE 1 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
40 TITLE The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
45 TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
source 1..649
50 /organism="Hylobates lar"
/db_xref="taxon:9580"
gene <1..>649
/ gene="HLA5"
CDS <1..>649
55 / gene="HLA5"

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/codon\_start=2  
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 /translation="WVDICFSTCIIPKMLVNIQTKNKAISYMDCLTQVYFSMLFPILD  
 TLLLTVMAYDRFVAICLPLHYMIIMNPRLCGLLIFVIWLGIVMTSLLHISLMMHLIFC  
 5 KDFEIPHFFCELTHILQLACSDTFLNSTLIYFMTGVLGVFLLGIIFSYSRIASSIRK  
 MSSSGGKQKALSTCGSHLSVVSIFYGTGIGVHFTSAVTHASQKISVASVMYTVVTP" (SEQ

ID NO:35).

BASE COUNT 133 a 189 c 124 g 203 t

ORIGIN

10 1 ctgggttgac atctgttca gcacttgcac catccccaag atgctggtga acatccagac  
 61 caagaacaaa gccatctcct acatggactg cctcacacag gtctatttct ccatgctttt  
 121 tctattctg gacacgtac tctgaccgt gatggcctat gaccggttg tggccatctg  
 181 cctccctctg cactacatga tcatcatgaa ccccgccctc tgtggcctcc tgattttgt  
 241 catctggctc attggtgtca tgacatccct cctccatatt tctctgatga tgcattta  
 15 301 ctctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacaca tctccagct  
 361 ggcctgctct gataccttcc tgaacagcac gttgatatac ttatgacag gtgtgctggg  
 421 cggttttccc ctcttggga tcattttctc ttattcacga attgctcat ccataaggaa  
 481 gatgtcctca tctgggggaa aacaaaaagc actttccacc tgtgggtctc acctctccg  
 541 tgtttcttta tttatggga caggcattgg gggtccactc acttctcag tgactcacg  
 20 601 ttccagaaa atctcgttg cctcggtgat gtacacggtg gtcaccccc (SEQ ID NO:34).

## OR25

LOCUS AF127838 651 bp DNA PRI 28-FEB-2000

25 DEFINITION Hylobates lar HLA6 pseudogene, partial sequence.

ACCESSION AF127838

KEYWORDS

SOURCE common gibbon.

ORGANISM Hylobates lar

30 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 651)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 651)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

40 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

45 source 1..651  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>651  
 /gene="HLA6"  
 /pseudo

BASE COUNT 127 a 176 c 139 g 209 t

50 ORIGIN

1 ctggctgac atcggttca ccaccaccac ggtccccgag atgattgtgg acatccaatc  
 61 tcacagcaga gtcatctcct aggagggccg cctgactcac atgtctctct ttgccattt  
 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgacagg tttagacca  
 181 tctgtcacc tctatatcat tcagccatca tgaacccgtg ttctgtggc ttctagtgt  
 55 241 tctttttt ctctcagtct tttagaggcc cagctgcata acttgattgc ctgctaag

301 acctgctca aggatgtgga aattcctaatttctctgtg acccttctca actccgcat  
 361 cttgcatgtt gtgacatctt caccaataac ataactcatgt atttctctgc tgccgtattt  
 421 gggctccttc ccatctcggg gacccttcc tcttactata aaatgggttc ctccattctg  
 481 aggccttcat cgtcagggtg gaagtataaa gccttctcca cctgtgggtc tcacctgtca  
 541 gtgtttgct gagttatgg aagaggcgtt ggagggtacc tcagtcaga tgtgtcctct  
 601 tccccagaa agtttgacgt ggcctcagtg atgtacacgg tggtcacccc c (SEQ ID NO:36).

## OR26

10 LOCUS AF127839 644 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA7 pseudogene, partial sequence.  
 ACCESSION AF127839  
 KEYWORDS .  
 SOURCE common gibbon.  
 15 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..644  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>644  
 /gene="HLA7"  
 /pseudo  
 35 BASE COUNT 130 a 168 c 128 g 218 t  
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 1 ctggcgctgac atcactttca cctcggccat ggttcccaag atgattgtgg acatgcagtc  
 61 gcatagcaga gccatctctt atgcaggctg cctgacacag atgtcttct ttgtcctttt  
 121 tgcattgatg gaagacatgc tctgactct gatggcctat gaccgatttg tggccatctg  
 40 181 tcacccctg cactaccag tcacgtgaa tctcacctc tgtgtctct tagtttgtt  
 241 gtctttttc ctagcctgt tggattcca gctacacagc tggattgtgt ttacaatcca  
 301 ccttttcaa gaatggaaat ctctaattt ttctgtgacc cgttcaact tctcaacctt  
 361 gcctgtctg acagcatcat cgataacata ttatatatt agatagccct atatttggt  
 421 ttcttccat ttcaggatc ctttgtctt agtataaaat tgttcccc attctgagaa  
 45 481 ttccatctc agatgggaag tataaagct tctccactg tggctctcac ctggcagttg  
 541 ttgcatttta tgaacaggc attggcgtg acctgacttc agctgtgtca tcaccccca  
 601 ggaatggtg ggtggcgtca gtgatgtat ctgtgtgtcac cccc (SEQ ID NO:37).

## OR27

50 LOCUS AF127840 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA74) gene, partial cds.  
 ACCESSION AF127840  
 KEYWORDS .  
 55 SOURCE common gibbon.

ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 15 source 1..649  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>649  
 /gene="HLA74"  
 20 CDS <1..>649  
 /gene="HLA74"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDFCYSTTITPKLLENLVVEYRTISFTGCIMQFFLVCIFVGTE  
 25 TFMLAVMAYDRCVAVCNPLLYTVAMSQRLLVATSYSWGIVCFLTLYFLELSFR  
 GNNIINNFCVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLMMIFTSYAFIFITVMK  
 MPSTGGRKKAFTCASHLTAITIFHGTILFLYCVPSKSSWLMVKVTSVFYTVFIP" (SEQ ID  
 NO:39).  
 BASE COUNT 142 a 157 c 129 g 221 t  
 30 ORIGIN  
 1 cttgttgat ttctgttatt ctactacgat tacacccaaa ctgctggaga acttggtgt  
 61 ggaatata actatttcct tcacaggatg catcatgcaa ttcttccttg tctgcatatt  
 121 tgtagggaca gaaacattca tgctggcagt gatggcctat gaccgatgtg tggcgggtgtg  
 181 taacctctt ctctacacag ttgcaatgtc ccagaggctt tgctcctgt tggtggctac  
 35 241 atcatactct tgggggatag tctgttctt gacacttacc tactttctac tgggaattac  
 301 cttcagagga aataatatca ttaataactt tgtctgtgag catgctgcca ttgttgctgt  
 361 gtctgtctt gaccctatg tgagccagga gatcacttta gttctgcca cattcaatga  
 421 aataagcagt ctgatgatga ttttcacttc ctatgcttgc attttatca ctgcatgaa  
 481 gatgccttc actggggggc gcaagaaagc gttctccacg tgtgcctccc acctgaccgc  
 40 541 cattaccatt ttcatggga ctatccttt cctctactgt gttcctaact ccaaaagtc  
 601 atgctcatg gtcaaggtga cctctgtctt ttacacagtg ttcattccc (SEQ ID NO:38).

## OR28

45 LOCUS AF127841 659 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA75 pseudogene, partial sequence.  
 ACCESSION AF127841  
 KEYWORDS .  
 SOURCE common gibbon.  
 50 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 659)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for

reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 659)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..659  
10 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>659  
/gene="HLA75"  
/pseudo  
15 BASE COUNT 123 a 178 c 143 g 215 t  
ORIGIN  
1 cttgcctgac atcggttca ccaccaccac ggtccccgag atgattgtgg acatccaatc  
61 tcacagcaga gtcattcct aggcaggccg cctgactcag atgtctctct ttgccatttt  
121 tggaggcatg gaagagagac atgctcctga gtgtgacggc ctatgaccgg ttgtagtag  
20 181 tctgtcacc tctatatcat tcagccatca tggaccctgt tttctgtgac ttcttagttt  
241 tgtgtcttt tttttctt ctcagtctt tcgactccca gctgcacaac ttgattgctt  
301 tgctaagac ttgctcaag gatgtggaaa ttctaattt ctctgtgac ccttctcaac  
361 tcccccatct tgcattgtgt gacagcatca ccaataacgt catcatgtat ttccctgtg  
421 cgtatttgg ttctctccc atctcgggga ccttttctc ttgctataaa atcgtttctt  
25 481 caattctgag ggtttcatca tcagggtgga ggtataaagc ctctccacc tgtgggtctc  
541 acctgtcagt tgtttgctga gtttatggaa gaggtgttgg aggttacctc agttcagggtg  
601 tgtcatcttc cccagaaaag ggtgcagtgg cctcagtgtg gtacacgggtg gtcaccccc (SEQ ID NO:40).

**OR29**

30 LOCUS AF127842 662 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar HLA8 pseudogene, partial sequence.  
ACCESSION AF127842  
KEYWORDS .  
35 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 662)  
40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 662)  
45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
50 source 1..662  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>662  
/gene="HLA8"  
55 /pseudo



BASE COUNT 124 a 178 c 143 g 217 t

ORIGIN

1 gtcacctgac gtcggttca cctccaccac ggtccccgag atgattgtgg acacccattc  
5 61 tcacagcaca gtcattcct aggcaggctg cctgactcag atgcctctct ttgccatfff  
121 tggaggcatg gaagagagac aagctcctga gtgtgatggc ctatgaccgg ttgtagcca  
181 tctgtcaccc tctatatcgt tcagccatca tgaatccgtg ttctgtggc tacctagttt  
241 tgtgtcttt tttttttt ttcgcagtcg ttagactcc cagctgcaca acttgattgc  
301 ctgtctaag acctgcttca gggatgcgga aattccta atttctgtg acccttctca  
10 361 actccccat ctgcatgtt gtgacacctt caccaataac ataactatgt tatttccctg  
421 ctgccatatt tggtttctt cccatctcgg ggaccctttt ctcttctgt aaaattgttt  
481 cctccgtttt gagggtttca tcgtcaggta ggaagtata agccttctcc acctgtgggt  
541 ctcacctgtc agttgtttgc tgagtttatg gaagaggcgt tggagggtac gtcagttcag  
601 atgtgtcttc ttccccaga aagggtgcag tggcctcagt gatgtacatg atggtcaccc  
661 cc (SEQ ID NO:41).

OR30

LOCUS AF127843 662 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla GGO1 pseudogene, partial sequence.

ACCESSION AF127843

KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
25 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 662)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

30 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 662)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
35 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..662  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
40 gene <1..>662  
/gene="GGO1"  
/pseudo

BASE COUNT 127 a 180 c 135 g 220 t

ORIGIN

45 1 ctgtgactgac atcggtttca cctccaccac agtccccaag atgattgtgg acatccagtc  
61 tcacagcaga gccatctcct atgcacgctg cctgactcag atgtctctct ttgccatfff  
121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca  
181 tctgtcaccc tctgtatcgt ccagccatct tgaacccctg ttctgtggc ttcctagatt  
241 cgttgtcctt gttttttt ttttttctc agtcttttag actcccagct gcacaacttg  
50 301 atgccttac aaatgacctg ctcatggat gtggaattc ctaatttct ctgggaacct  
361 tctcaactcc cccatcttgc atgtgtgac accitcacca ggaacatcaa cctgtatttc  
421 cctgtcgcca tatttggtt tcttcccatc tcggggaccc ttttctctta ctataaaatt  
481 gtttctcca ttctgaaggt ttcatcagg gtggaagtata aaccttctcc gcctgtggtt  
541 ctacactgtc agttgtttac tgattttatg gaacaggcgt tggagggtac ctcggttcag  
55 601 atgtgtcatc ttccccaga aagggtgcag tggcctcagt gatgtacacg gtggtcaccc

661 cc (SEQ ID NO:42).

### OR31

5 LOCUS AF127844 650 bp DNA PRI 28-FEB-2000  
DEFINITION Gorilla gorilla GGO17 pseudogene, partial sequence.  
ACCESSION AF127844  
KEYWORDS .  
SOURCE gorilla.  
10 ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 650)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
15 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 650)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..650  
25 /organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>650  
/gene="GGO17"  
/pseudo  
30 BASE COUNT 129 a 170 c 137 g 214 t  
ORIGIN  
1 ttttctgac ctctgttta cctccacgac tgtccaaag atgtactga atatactgac  
61 acagaacaaa ttcataacat atgcaggctg tctcggcag attttttt ttcactcat  
121 ttggatgctt ggacaattta ctcttgactg tgatggccta tgaccgcttc gtggccatct  
35 181 gtcacccct gcactatacg gtcacatga acccccggtc ctgtggactg ctggttctgg  
241 ggtctcgtg catcagtgc atgggtccc tgctcgagac ctgactgtt ttgaggctgt  
301 cctctgcac caaatggaa attccacact tttttgtga tcttctgaa gtcctgaagc  
361 tcgcctgttc tgacaccttc attaataacg tggatgata cttgcaact ggcgtcctgg  
421 gtgtattcc ctctactgga atattttct ctactataa aattgtttc tctatactga  
40 481 ggatttcctc agctgggaga aagcacaagg cgtttccac ctgtggttc cacctctcag  
541 tggtcacctt gttctatggc acgggcttg gggctctatc cagttctgca gccacacat  
601 ctctaggac aagtctggtg gcctcagtga tgtacacat ggtcaccccc (SEQ ID NO:43).

### OR32

45 LOCUS AF127845 649 bp DNA PRI 28-FEB-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO18) gene, partial cds.  
ACCESSION AF127845  
KEYWORDS .  
50 SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 649)  
55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..649  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>649  
 /gene="GGO18"  
 15 CDS <1..>649  
 /gene="GGO18"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFVSTTVPKMLVNIQTHNKVITYAGCITQMCFFLLFVGLD  
 20 NFLLTVMAYDRFVAICHPLHYMVIMNPQLCGLLVLASWIVGVLNSMLQSLMVLPLPFC  
 THMEIPHFFCEINQVVHLACSDTFLNDIVMYFAVALLGGGPLNGILYSYSKIVSSIRA  
 ISSAQGKYKAFSTCASHLSVVSFLFYGTCLGVYLSSAATHNSHTGAAASVMYTVVTP" (SEQ  
 ID NO:45).  
 BASE COUNT 136 a 172 c 134 g 207 t  
 25 ORIGIN  
 1 cttcgtagac atctgttttg tctctaccac tgtcccgaag atgtggtga acatccagac  
 61 acacaacaaa gtcacacact atgcaggctg catcaccag atgtgctttt tcttactct  
 121 tgtaggattg gataactcc ttctgaccgt gatggcctat gaccggttg tggccatctg  
 181 tcacctctg cactacatgg tcattatgaa cctcaactc tgggactgc tggttctggc  
 241 gtcctggatc gtgggtgttc tgaattccat gttacaaagc ttaatgggtg tgccactgcc  
 301 cttttgaca cacatggaaa tcctcattt ttctgtgaa attaatacagg tggccacact  
 361 tgcctgtttg gacaccttc ttaatgacat agtgcgttat ttgcagtag cactgctggg  
 421 cgggtgtccc ctcaatggga tctgtactc ttactctaag atagtttcct ccatacgtgc  
 481 aatctcatca gtcaggggga agtataaggc atttccacc tgtgcactc acctctcagt  
 35 541 tgtctcctta tttatggta catgcttagg ggtgtacctt agttctgctg caaccacaa  
 601 ttacacaca ggtgtgcag cctcagtgat gtacactgtg gtcaccccc (SEQ ID NO:44).

### OR33

40 LOCUS AF127846 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO19) gene, partial cds.  
 ACCESSION AF127846  
 KEYWORDS .  
 SOURCE gorilla.  
 45 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..649  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>649  
/gene="GGO19"  
10 CDS <1..>649  
/gene="GGO19"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFISTTVPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD  
TFLLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVLASWFIIFWFSLVHVLLMKRLTFS  
15 TGTEIPHFCEPAQVLKVACSNLLNNIVLYVATALLGVFPVAGILFSYSQIVSSLMR  
TSSTKGKYKAFSTCGSHLCVVSLFYGTGLGVYLSSAVTHSSQSSSMASVMYAMVTP" (SEQ

ID NO:47).

BASE COUNT 118 a 189 c 144 g 198 t

ORIGIN

20 1 ctttgggac atctgttca tctccaccac agtccccaag atgctagtga acatccaggc  
61 acggatcaaa gacatctct acatgggggtg cctcactcag gtgtatttt taatgatgt  
121 tgctggaatg gatacttcc tactggctgt gatggcctat gaccggttg tggccatctg  
181 ccacccctg cactacacgg tcacatgaa cccctgcctc tgtggcctcc tggttctggc  
241 atcttggtc atcattttt ggttctcgt ggtcattgt ctactgatga agaggtgac  
25 301 ctttccaca ggcaactgaga ttccgcattt cttctgtgaa ccggctcagg tcctcaaggt  
361 ggctgctct aacaccctcc tcaataacat tgtctgtat gtggccacgg cactgctggg  
421 tgtgttctt gtactggga tctcttctc ctactctcag attgtctct ccttaatgag  
481 aacgtctcc accaaggga agtacaagc ctttccacc tgtggatctc acctctgtgt  
541 ggtctcttg ttctatgaa caggactgg ggtctatctg agttctgtg tgaccattc  
30 601 ttccagagc agtccatgg cctcagtgt gtacgccatg gtcacccc (SEQ ID NO:46).

OR34

LOCUS AF127847 649 bp DNA PRI 28-FEB-2000  
35 DEFINITION Gorilla gorilla olfactory receptor (GGO2) gene, partial cds.  
ACCESSION AF127847  
KEYWORDS  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
45 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
50 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Gorilla gorilla"  
55 /db\_xref="taxon:9593"

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gene      <1..>649
          /gene="GGO2"
CDS       <1..>649
          /gene="GGO2"
5          /codon_start=2
          /product="olfactory receptor"
          /translation="FVDICVTSTTVPKTLSNIRTQSKVITYAGCITQMYFFILFVVLD
          SLLLTVMAYDRFVAICHPLHYTVIMNSWLCGLLVLSWIVSILCSPLQSIMALQLSFC
          TELKIPHFFCELNQVVHLACSDTFIKDMMMNFSTVLLGGGCLAGIFYSYFKILCCICS
10         ISPAQGMNKALSTCASHLSVVSFLFYCTGVGVYLLSSAATHNSLSNAAASVMYTVVTS" (SEQ
ID NO:49).
BASE COUNT   146 a   166 c   129 g   208 t
ORIGIN
15         1 cttgtagac atctgtgta cctccaccac agtcccaaag acactgtcaa acatccggac
          61 acagagcaaa gtcacacac atgcagggtg catcaccagc atgtactttt ttatactctt
          121 tgtagtgttg gacagcttac tctgaccgt gatggcctat gaccgggttg tggccatctg
          181 tcacccctcg cactacacag tcattatgaa ctctggctc tgggactgc tggttctggt
          241 gtcctggatc gtgagcatcc tatgtctcc gttacaaagc ataatggcat tgcagctgtc
          301 cttctgtaca gaattgaaaa tccctcattt ttctgtgaa cttaatcagg tcgtccacct
20         361 tgctgtctt gacactttta ttaagacat gatgatgaat ttacaagtg tgcgtgtggg
          421 tgggggatgc ctgctggaa tattttactc ttactttaag ataccttgtt gcatatgttc
          481 aatctacca gtcaggggga tgaataaagc acttccacc tgcgcatctc acctctcagt
          541 tgtctcctta tttattgta caggcgtagg tgtgtacctt agttctgtg caaccataa
          601 ctcacttca aatgctgcag ctcagtgat gtacaccgtg gtcacctcc (SEQ ID NO:48).
25

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### OR35

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LOCUS   AF127848   649 bp   DNA       PRI   28-FEB-2000
DEFINITION  Gorilla gorilla olfactory receptor (GGO3) gene, partial cds.
30  ACCESSION   AF127848
KEYWORDS   .
SOURCE     gorilla.
ORGANISM   Gorilla gorilla
          Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
35  Eutheria; Primates; Catarrhini; Hominidae; Gorilla.
REFERENCE  1 (bases 1 to 649)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     The olfactory gene repertoire in primates and mouse: evidence for
          reduction of function in primates
40  JOURNAL    Unpublished
REFERENCE  2 (bases 1 to 649)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     Direct Submission
JOURNAL    Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
45  Montpellier Cedex 5 34396, France
FEATURES   Location/Qualifiers
          source          1..649
          /organism="Gorilla gorilla"
          /db_xref="taxon:9593"
50  gene      <1..>649
          /gene="GGO3"
CDS       <1..>649
          /gene="GGO3"
          /codon_start=2
55  /product="olfactory receptor"

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/translation="FVDTSFISTTVPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD
TFLLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVLASWFIIFWFSVLVHILLMKKLTF
TGTEIPHFCEPAQVLKVACSNLLNNIVLYVATALLGVFPVAGILFSYSQIVSSLMR
TSSTEGKYKAFSTLWISLCVVSLFYGTGLGVYLSSAVTHSSQSSSMASVMYAVVTP" (SEQ ID
5 NO:51).
BASE COUNT 117 a 194 c 143 g 195 t
ORIGIN
1 ctttgtggac acctcttca tctccaccac agtccccaag atgctagtga acatccaggc
61 acggatcaaa gacatctcct acatgggggtg cctcactcag gtgtatttt taatgatgtt
10 121 tgctggaatg gatacttcc tactggccgt gatggcctat gaccggttg tggccatctg
181 ccacccctg cactacacgg tcacatgaa cccctgcctc tgtggcctcc tggttctggc
241 atcttggtc atcattttt ggttctcct ggttcattt ctactgatga agaagtggac
301 cttctccaca ggcactgaga ttccgcattt cttctgtgaa ccggctcagg tcctcaaggt
361 ggcctgctct aacaccctcc tcaataacat tgtctgtat gtggccacgg cactgctggg
15 421 tgtgttctct gtagctggga tcctcttctc ctactctcag attgtctct cctaatgag
481 aacgtctcc accgaggcca agtacaagc ctttccacg ctgtggatct cctctgtgt
541 ggtctcctg ttcatggaa caggactgg ggtctatctg agttctgctg tgaccctac
601 ttccagagc agtccatgg cctcagtgt gtacgccgtg gtcacccc (SEQ ID NO:50).

20 OR36

LOCUS AF127849 650 bp DNA PRI 28-FEB-2000
DEFINITION Gorilla gorilla GGO4 pseudogene, partial sequence.
ACCESSION AF127849
25 KEYWORDS .
SOURCE gorilla.
ORGANISM Gorilla gorilla
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.
30 REFERENCE 1 (bases 1 to 650)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
JOURNAL Unpublished
35 REFERENCE 2 (bases 1 to 650)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
Montpellier Cedex 5 34396, France
40 FEATURES Location/Qualifiers
source 1..650
/organism="Gorilla gorilla"
/db_xref="taxon:9593"
gene <1..>650
45 /gene="GGO4"
/pseudo
BASE COUNT 134 a 164 c 132 g 220 t
ORIGIN
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50 61 acatagcaga gtcactcct atgggggccg cctgacacag atgtcttct ttgtcctttt
121 tgcatgtatg gatgacatgc tccggactct gatggcctat gaccgatttg tggccatctg
181 tcacccctg cactaccacg tcacatgaa tctcacctc tgtgtctct tagttttgt
241 gcctttttc cttagcctgt tggattccca gctgcacagc tggattgtgt tacaattcac
301 ttgctcaag aatgtggaaa tatctaatt ttatgtgat ccatctcaac ttctcaact
55 361 tgactgttct gaacagtgtc atcaatagca tattcacata tttagatagt actatgtttg

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421 gtttcttcc catttcagg atcctttgt ctactataa aattgtccc tccattctaa  
 481 gaattccatc gtcagatggg aagtataaag ccctctccac ctgtggctct cacctgtcag  
 541 ttgtttgctt atttatgga ataggcattg gcgtgtacct gacttcagct gtgtcaccac  
 601 caccaggaa tgggtggtg gcatcagtga tctacgagg ggtcaccccc (SEQ ID NO:52).

5

## OR37

LOCUS AF127850 650 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla GGO70 pseudogene, partial sequence.

10 ACCESSION AF127850

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..650

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

30 gene <1..>650

/gene="GGO70"

/pseudo

BASE COUNT 128 a 170 c 134 g 218 t

ORIGIN

35 1 cttgcctgac atcggtttca cctccaccat gggtcccaag atgattgtgg acgtccaatc  
 61 tcacagcagg ttcatctcct atgcaggctg cctgactcag atatctctct ttgccatttt  
 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca  
 181 tctgtcacc tctatatcat tcagccatca tgaaccctg tttctgtggc ttctagatt  
 241 tgctgtcttt tttttctt tttttctcag tcttttagat ggtcagctgc agaactgat  
 40 301 tgccttaaa atgacctgct tcgaggatgt gggaattcct aatttctct gtgacccttc  
 361 tcaactgccc catctcacat gttgtgacat cttaccaat cacataatca tgtatttccc  
 421 tgctgccata ttggtttt ttcccatctc ggggacctt ctctcttacc atgtaattgt  
 481 ttctccatt ctgagggttt catcatctat gggagggtga aagccttccc cacctgtgag  
 541 ttgtttgctg atattatgga acaggcttcg gaggttacct cagttcagat gtgttatctt  
 45 601 caacaagaaa ggctgcagtg gcctcagtga tgtacagggt ggtcacgccc (SEQ ID NO:53).

## OR38

LOCUS AF127851 649 bp DNA PRI 28-FEB-2000

50 DEFINITION Gorilla gorilla olfactory receptor (GGO71) gene, partial cds.

ACCESSION AF127851

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
5 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

15 /organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>649

/gene="GGO71"

CDS <1..>649

20 /gene="GGO71"

/codon\_start=2

/product="olfactory receptor"

/translation="FADLCFTSTTVPKMLLNILTQNKFITYAGCLGQIFFFTSFGCLD  
NLLLTVMAYDRFVAICHPLHYTVIMNPRLCGLLVLGSWCISVMGSLLETTLTVRLSFC  
TKMEIPHFFCDLLEVLKLACSDTFINNVIYFATGVLGVIPFTGIFFSYKIVFSILR  
25 ISSAGRKHKAFSTCGSHLSVVTIFYGTGFGVYLSSAATPSSRTSLAASVMYTMVTP" (SEQ ID  
NO:55).

BASE COUNT 130 a 171 c 136 g 212 t

ORIGIN

1 ttttgcac ctctgttta cctccacgac tgcctcaaag atgtactga atatactgac  
30 61 acagaacaaa ttcataacat atgcaggctg tctcggtcag attttttt tcacttcatt  
121 tggatgcctg gacaatttac tctgactgt gatggcctat gaccgcttcg tggccatctg  
181 tcacccctcg cactatacgg tcatcatgaa cccccggctc tgtggactgc tggttctggg  
241 gtctgtgtgc atcagtgtca tgggttcctc gctcgagacc ttgactgttt tgaggctgtc  
301 ctctgcacc aaaatggaaa ttccacactt ttttgtgat ctcttgaag tcctgaagct  
35 361 cgcctgttct gacaccttca ttaataacgt ggtgatatac ttgcaactg gcgtcctggg  
421 tgtgattccc ttactggaa tattttctc ttactataaa attgtttct ctatactgag  
481 gatttctca gctggagaa agcacaagc gtttccacc tgtggtccc acctctcagt  
541 ggtcaccttg ttctatggca cgggcttgg ggtctatctc agttctgcag ccacaccatc  
601 ttctaggaca agtctggcgg cctcagtgat gtacaccatg gtcaccccc (SEQ ID NO:54)

40

**OR39**

LOCUS AF127852 649 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU35) gene, partial cds.

45 ACCESSION AF127852

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
50 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

55 JOURNAL Unpublished



REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 5 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
         /organism="Eulemur fulvus"  
         /db\_xref="taxon:13515"  
 10 gene <1..>649  
         /gene="EFU35"  
     CDS <1..>649  
         /gene="EFU35"  
         /codon\_start=2  
 15 /product="olfactory receptor"  
         /translation="LTDICLSTATVPKMLANIRTRSQSITYAACLTQMCFVLGSATLE  
         NFLAVMAYDRYVAICHPLRYAVIMNLRRLCGFLILLSLSISIMDTLLHDLMLVRLSFC  
         THLEIPLFFCEVVQVIKLACSDTLINLLIYFAAGVLGGVPLSGIIFSQTQIASSVLR  
         MASASGKYKAFSTCGSHLSVVSLLYGTGLGVYISSAFMHSPRTMAVASMMYTUVTP" (SEQ  
 20 ID NO:57).  
 BASE COUNT 123 a 176 c 148 g 202 t  
 ORIGIN  
     1 cctcactgac atctgttaa gcacagccac cgtcccaaag atgtggcaa acatccgaac  
     61 acggagtcag agcatcacgt atgcagcctg cctcaccag atgtgcttg ttctgggttc  
 25 121 tgctacgttg gaaaatttc tctggcagt aatggcttat gaccgctatg tgcccatctg  
     181 tcactctctg agatacgcgg tcacatgaa cctcgtctc tgggcttct tgatccttt  
     241 gtcctgtct attagcatca tggacaccct gtcacagat ctgatgtct tgcggctgtc  
     301 ctctgcaca cacctggaga taccctctt ctctgcgag gttgtgcaag tcacaaact  
     361 tgctgttct gataccctca tcaataacct ctgatatat ttgcagctg gcgtgttggg  
 30 421 aggtgttct ctgtctggga tcatttctc ttactcag attgcctct ctgtttgag  
     481 aatggcatca gcaagtggaa agtataaagc ttttccacc tgggctctc acctctcgt  
     541 tgtgtcctg ctctacggga caggttggg ggtgtacatc agttctcgt ttatgcactc  
     601 tccaggacg atggcagtg cttcaatgat gtacacggtg gtcactccc (SEQ ID NO:56).  
 35 **OR40**  
 LOCUS AF127853 645 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU36 pseudogene, partial sequence.  
 ACCESSION AF127853  
 40 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 45 REFERENCE 1 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 50 REFERENCE 2 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 55 FEATURES Location/Qualifiers

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source      1..645
            /organism="Eulemur fulvus"
            /db_xref="taxon:13515"
5  gene      <1..>645
            /gene="EFU36"
            /pseudo
BASE COUNT  118 a  189 c  138 g  200 t
ORIGIN
10  1 cttgtctgac gtctgttca cctccaccac ggtgcccaag atgttagtga acatccaggc
    61 gcacagcaag gccatcacat acaaaggctg cctcaccag atgtgtttt tcttgattt
    121 tgggtgggcta gttgctact gacggtgatg gcctatgacc ggttcgtggc catctgtcac
    181 ccctgcgct acatggicat catgaacccc aggcctctgtg gtctctgct tctccttct
    241 tggttgatct gcttgacgta ttctctgctg caaagtctga tggtttgag ggtgtcctc
    301 tgccaagaaa tagaaatccc ccactacttc tgtgaacttg ctgatacct cacgctcgcc
15  361 tgctctgaca ccctagttaa tgacgtcctg ctgtatttc tatctgctct gtcggtgtt
    421 attcccctga ctgggatcct ttattcttat tccagaatta tctctccat aatgtgcatt
    481 tcctctgctg gagggagta caaagccttt tccacctgtg ggtctcacct ctccgtcgct
    541 tcctgttct acggtacagg cctgggggtc tacctaact ctgaacagc ccagccctcc
    601 agaaggggtt caatagcctc ggtgatgtac accatggtca ccccc (SEQ ID NO:58).
20

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## OR41

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LOCUS      AF127854  647 bp  DNA      PRI    28-FEB-2000
DEFINITION Eulemur fulvus EFU37 pseudogene, partial sequence.
25  ACCESSION AF127854
KEYWORDS
SOURCE     Eulemur fulvus.
ORGANISM   Eulemur fulvus
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
30  Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.
REFERENCE  1 (bases 1 to 647)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     The olfactory gene repertoire in primates and mouse: evidence for
           reduction of function in primates
35  JOURNAL  Unpublished
REFERENCE  2 (bases 1 to 647)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     Direct Submission
JOURNAL   Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
40  Montpellier Cedex 5 34396, France
FEATURES   Location/Qualifiers
           source      1..647
           /organism="Eulemur fulvus"
           /db_xref="taxon:13515"
45  gene      <1..>647
           /gene="EFU37"
           /pseudo
BASE COUNT  118 a  192 c  141 g  196 t
ORIGIN
50  1 cttgttgac atctgttca cctccaccac catccccaag atgactgtgg acatcctaac
    61 tcacagcaga gtcatctct ctgggggctg tctgaccag atgtctctg ctctgtttt
    121 tgtttgtgtg gatgatatgc ttctgaccgt gtcggcctgt gacctgttg tggccatctg
    181 ccacccctct cactacacgg tcatcatgaa cccccacttc tgtggcctcc tggttctgat
    241 atcttggttc atcatgtccc tggttgtcct ggttcacctc ctactgataa ggaggctgac
55  301 attcccagg gccacagaaa tccacatta cttctgtgaa ctggctcaaa ttctcaag

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361 ggccactct gacagcttca tcaataacat ctcttctac ttgtcggctg tgttgctggg  
 421 tgtgtttccc atcacaggga tcctctactc ctactctaaa attgtctcct ccgtaatgag  
 481 gatgtcgtcc actgcaggca agaagaaagc attttccacc tgtgggtctc atttgtgtgg  
 541 tctgctgtt ctatggaaca gggttgggg tctacctcag ctctgtgtg accccttctt  
 5 601 cccagagcag cagcattgcc tcagtgtgt actcgggtgt caccccc (SEQ ID NO:59).

## OR42

LOCUS AF127855 652 bp DNA PRI 28-FEB-2000  
 10 DEFINITION Eulemur rubriventer ERU38 pseudogene, partial sequence.  
 ACCESSION AF127855  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 20 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..652  
 /organism="Eulemur rubriventer"  
 30 /db\_xref="taxon:34829"  
 gene <1..>652  
 /gene="ERU38"  
 /pseudo  
 BASE COUNT 124 a 191 c 136 g 201 t  
 35 ORIGIN  
 1 cttgttgac atctgttca cctccaccac catccccaag atgctgggtga acattgacac  
 61 acacagcaaa gacatctect acgtgggatg cctcactcag atgtatttt tcatgggtgt  
 121 tgggtggactg gacaacttcc tctgaccgt gatggcctgt gaccggttg tggccatctg  
 181 tcacccctg cactatgcag tacagtcatc atgaaccccc gcttctgtgc cctcctggtt  
 40 241 ctgatgtctt ggttcatcat gtccctggat gccctgggtc atgttctact tatactgagg  
 301 ctgaccttt ccttagaaac tgaatccca catttcttct gtgacctggc tcagatgctc  
 361 gaggtggccc gctctgacac cttatcaat aacatctgct tgtactgtt ggctgtgtt  
 421 ctgtatgtt cctgtcacgg ggatcctcta cccctactct aaaattgtct cctcctaat  
 481 gaggatgtcc tccactgcag gcaagaagaa agcattttcc acctgtgggt ctcacctctc  
 45 541 tgtgtgtctc ttgtctatg gaacaggact tgggtgtctac ctaagttctg ctgtgacccc  
 601 ttctcccg agcagcgcca ttgcctcagt gatgtacaca gtagtcacc cc (SEQ ID NO:60).

## OR43

50 LOCUS AF127856 648 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer ERU39 pseudogene, partial sequence.  
 ACCESSION AF127856  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 55 ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..648  
 15 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>648  
 /gene="ERU39"  
 /pseudo

20 BASE COUNT 132 a 173 c 141 g 202 t  
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 1 ctttgcagac atctgttttg tgtccaccac tgtcccagag atgctgaatg tgcagacatg  
 61 gagcaaagtc atactctaca caggctgcat caccagatg gacttttct tgcctttgt  
 121 aggactggac aacttcctcc tgaccgtgat ggccgtgtgac cggtttggg ccatctgtca  
 25 181 cccctgcac tatgcagtac agtcatcatg aaccccaggc tctgtgcatt tctgttctg  
 241 gtgttctgga tcctgagtgt cctgaattcc ttgtacaaa gcttaatggt gttgcagata  
 301 acctctgta cagacttga aatccccac ttttctgtg aactaatca gataatccac  
 361 cttgcctgtt tggacacctt tctaatgac atggtgatgt atttggcagt gatgctgctg  
 421 ggtggggggg gccttactgg gatcctttac tctactcta agatagtctc ctccgtacgt  
 30 481 gcaatctct cggtcaggg gaagtataaa gcattttcca cctgtgcac tcacctctcg  
 541 gtcgtctct tattttattg tacatgccta ggggtgtacc tcagttctgc tacacacaac  
 601 tcactcca gcgaacagc ctcggtgatg tacacggtgg tcactccc (SEQ ID NO:61).

**OR44**

35 LOCUS AF127857 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer olfactory receptor (ERU40) gene, partial cds.  
 ACCESSION AF127857  
 KEYWORDS .

40 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 649)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 55 source 1..649

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/organism="Eulemur rubriventer"
/db_xref="taxon:34829"
gene    <1..>649
        /gene="ERU40"
5    CDS    <1..>649
        /gene="ERU40"
        /codon_start=2
        /product="olfactory receptor"
        /translation="LSDICFTSTTIPKMLVNLHAHSDISYRECLTQVYFFMIFAGLD
10    NFLLTVMAYDRFVAICHPLHYMVIMNPRFCALLVLMSEFIMSLVALVHVLLILRLTFS
        LETEIPHFSCEVAQILKVARSDTFFNNICLYLSAVLLGVFPVMGILFSYSKIVSSLMR
        MSSTSAKNKAFSTCGSHLCVVSFLFYGTALGVYLSSAVTPSSQSSAIASVMYTVVTP" (SEQ ID
NO:63).
BASE COUNT    119 a   187 c   131 g   212 t
15    ORIGIN
        1 cctttctgac atctgttca cctctaccac catcccaaag atgctgggga accttcacgc
        61 acacagcaaa gacatctcct acagggagtg cctcactcag gtgtattttt ttatgatttt
        121 tgcaggactg gataatttcc tcctgaccgt gatggcctat gaccgggttg tgcccatctg
        181 cccccctctg cactacatgg tcatcatgaa tccccgcttc tgtgccctcc tggttctcat
20    241 gtcttggttc atcatgtctc tggttgccct ggttcattgt ctactatat tgaggctgac
        301 tttttccta gaaactgaaa tcccacattt ctctgtgag gtggctcaga ttctcaaggt
        361 ggcccgctct gacaccttct tcaataacat ctgcttatac ttgtcggctg tgttgcctggg
        421 tgtgttccc gtcattggga tcctctctc ctactctaaa attgttcat ccttaatgag
        481 gatgtcctcc acttcagcaa agaataaagc atttccacc tgtgggtctc acctctgtgt
25    541 ggctctttg ttctatggaa ctgcacttgg ggtctacctc agctctgctg tgacccttc
        601 ttccagagc agcgccattg cctcagtgat gtacacgggtg gtcaccccc (SEQ ID NO:62).

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## OR45

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30    LOCUS    AF127858    648 bp    DNA        PRI    28-FEB-2000
        DEFINITION    Eulemur fulvus EFU56 pseudogene, partial sequence.
        ACCESSION    AF127858
        KEYWORDS
        SOURCE    Eulemur fulvus.
35    ORGANISM    Eulemur fulvus
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.
        REFERENCE    1 (bases 1 to 648)
            AUTHORS    Giorgi,D.G. and Rouquier,S.P.
40    TITLE    The olfactory gene repertoire in primates and mouse: evidence for
            reduction of function in primates
            JOURNAL    Unpublished
        REFERENCE    2 (bases 1 to 648)
            AUTHORS    Giorgi,D.G. and Rouquier,S.P.
45    TITLE    Direct Submission
            JOURNAL    Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
            Montpellier Cedex 5 34396, France
        FEATURES
            Location/Qualifiers
            source
50                1..648
                    /organism="Eulemur fulvus"
                    /db_xref="taxon:13515"
            gene
                    <1..>648
                    /gene="EFU56"
                    /pseudo
55    BASE COUNT    131 a   180 c   142 g   195 t

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121 tgcagagtag gcatcttct cctgacttg atggcctatg actggtttg ggccatctgt  
5 181 caccctcgc actatgtgct catcatgaac cccaggctct gtcactgct tttctggg  
241 tcctggatca tgagtgcct gaattcctg ttgcaaagct taatgggtt gccactgcc  
301 ttctgtcag agttggaat ccccagttt ttctgtgaac ttaacagat aatctcctt  
361 gcctgtctg acaccttct taatgacgtg gtgatgtatt tggcagctat gctactggg  
421 gaggggtgcc ttactggat ccttactct tactctaaga tagttcctc cgtacgtgca  
10 481 atctcctcg ctcaggggaa gtataagca tttccacct gtcatctca cctctcggtc  
541 gtctccttat ttactgcac aagcctcgg gtgtacctg gctctgctgc tacacacaac  
601 tcactcca gcgaacagc ctcggtgatg tacaggtgg tactccc (SEQ ID NO:64).

# OR46

15 LOCUS AF127859 643 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU57) gene, partial cds.  
ACCESSION AF127859  
KEYWORDS .  
20 SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
REFERENCE 1 (bases 1 to 643)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 643)  
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
35 source 1..643  
/organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
gene <1..>643  
/gene="EFU57"  
40 CDS <1..>643  
/gene="EFU57"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FADICFVSTTVP EMLNVQTSKVISYTGCTQMDFFLLFVGLDN  
45 FLLTVMAYDRFVAICHPLRYAVIMNPRLCVFLVLSWLSVLNSLSQSLMVLRLTFCT  
DLEIPHFCELNQIIHLACSDTFLNDVVMYLAVMLLGGGCLTGILYSYSKIVSSVRAI  
SSAQGKCKAFSTCASHLLVVSIFYCTCLGVYLSSATHNSHSSATASVMYTVVTP" (SEQ ID  
NO:66).  
BASE COUNT 127 a 171 c 143 g 202 t  
50 ORIGIN  
1 ctttcagac atctgtttg tgcaccac tgcacagag atgctgaatg tgcagacatg  
61 gagcaaaagc atacttaca caggctgcat caccagatg gacttttct tgcctttgt  
121 aggactggac aactctccc tgacctgat ggcctatgac cgtttgtgg ccatctgca  
181 cccctcgcg tatgcagtca tcatgaacc caggctctgt gtattcttg ttctgtgtc  
55 241 ctggatcctg agtgcctga attcctgtc acaaagctta atggtgttgc ggctaacct

301 ctgtacagac ttggaatcc cccactttt ctgtgaactt aatcagataa tccaccttgc  
 361 ctgttcggac accittctta atgacgtggt gatgtatttg gcagtgatgc tgctgggtgg  
 421 gggatgcctt actgggatcc ttactctta ctctaagata gtttctccg tacgtgcaat  
 481 ctctcggct caggggaagt gtaaagcatt ttccacctgt gcattcacc tcttggtcgt  
 5 541 ctcttattt tattgtacat gcctaggggt gtacttgagt tctgtacac acaactcaca  
 601 ctccagcgca acagcctcgg tgatgtacac ggtggtcact ccc (SEQ ID NO:65).

#### OR47

10 LOCUS AF127860 644 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer ERU66 pseudogene, partial sequence.  
 ACCESSION AF127860  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 15 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..644  
 30 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>644  
 /gene="ERU66"  
 /pseudo  
 35 BASE COUNT 113 a 191 c 145 g 195 t  
 ORIGIN  
 1 cttttctgac atctgtttca cttccgccac catcccaaag atgctgtgga gcattcgggc  
 61 acagagcaaa tccatcacg gtcccggtg cctcacacag atgtactgtt tcatggcttt  
 121 tggacttctg gacaatctga tgctgatggt catggcttat gaccacttgg tggccatctg  
 40 181 tcaccctctg cactacacag tcatcatgaa cccagtgtct tgtgtccagg tgcttctcca  
 241 caccgggctt gtcagcatcc tgggggcctt cctcgagag tgaccgtgtt gcggcttctt  
 301 ttggtgcagt cactgaaatc ccacactatt tctgtgagct ccctgaggct ctccagctct  
 361 cccactctga cccctccatc aataatgtca tattatacat tgtgacgggt tcatgggctt  
 421 ctttctctt gctgagattc ttctctta ttctccaact gtttttctg tcttgaggat  
 45 481 ctcaacagca ggggggaagt ataaagtgtt ttctcctgt gactctcacc tctcggttgt  
 541 ctgcctgttc tgtgggacct gcctggggtc tagctcagt ccacatggac acacgttctt  
 601 ccgacagggg tgtgctctg gtccataca ctgtatcac cccc (SEQ ID NO:67).

#### OR48

50 LOCUS AF127861 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer olfactory receptor (ERU67) gene, partial cds.  
 ACCESSION AF127861  
 KEYWORDS .  
 55 SOURCE Eulemur rubriventer.

ORGANISM *Eulemur rubriventer*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; *Eulemur*.

REFERENCE 1 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 15 source 1..649  
 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>649  
 /gene="ERU67"  
 20 CDS <1..>649  
 /gene="ERU67"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FMDICFTTVIVPKMLVNFLSETKAISYVGCLVQMYFFMALANTD  
 25 SYLLASMAIDRLVAICKPFHYDVVMSPRRCLLMLLGSC TISHLSLFRVLLMSRLSFC  
 ASHIKHFFCDTQPVLKLS CSDTSSSQIVVM TETLA VIVTPFLCHFSYLR IITVLA  
 IPSAAGKWKA FSTCGSHLTVVVL FYG SVIYVYFRPLSMYSVMKDRVATVMYTVVTP" (SEQ  
 ID NO:69).  
 BASE COUNT 119 a 200 c 141 g 189 t  
 30 ORIGIN  
 1 ttcttggtat atctgcttca caacagtcac tgtgccaag atgctgggtga atttctgtc  
 61 agagacaaag gccatctcct atgtgggctg tctggtccag atgtacttct tcatggccct  
 121 tgcaaacact gacagctacc tactggcctc catggctatt gaccggctgg tggccatctg  
 181 caaaccttc cactatgatg tggttatgag cccacggcgt tgcctctca tgcgttggg  
 35 241 ttcttgcaac atctcccacc tacactccct gtccgggtg ctactcatgt ctgcctgtc  
 301 ttctgtgcc tccacatca ttaagcactt ttctgtgat accagcctg tgctaaagct  
 361 ttctgtctt gacacatct ccagccagat tgtggtcatg accgagacc tggctgtcat  
 421 cgtgaccccc ttctgtgca tcatcttctc ctatctgaga atcatcatca ctgtgctgc  
 481 aatcccctct gcagccggga agtggaagge cttctccacc tgtggctccc acctcactgt  
 40 541 ggtggtcctg ttctatggca gtgtcatcta tgtgtattc aggccctgt ccatgtactc  
 601 agtgatgaag gaccgggtag ccacagttat gtacacgga gtgacacct (SEQ ID NO:68).

## OR49

45 LOCUS AF127862 649 bp DNA PRI 28-FEB-2000  
 DEFINITION *Eulemur fulvus* olfactory receptor (EFU83) gene, partial cds.  
 ACCESSION AF127862  
 KEYWORDS .  
 SOURCE *Eulemur fulvus*.  
 50 ORGANISM *Eulemur fulvus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; *Eulemur*.  
 REFERENCE 1 (bases 1 to 649)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for



reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
10 /organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
gene <1..>649  
/gene="EFU83"  
CDS <1..>649  
15 /gene="EFU83"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FSDICLVSTTPQMLVNVQTHSKVISYAGCVTQMDFVLFVGLD  
SFLTVMAYDRFVVICHPLHYAVTMNPRLCGLLVLLSWIMSALSSLLESLVVLWVCFC  
20 LDLEIPHFFCELNEIIHLACSDTFLIDMVMYFSALLLGGGSLAGILYSYSKIVSSVRA  
ISSAQGKYKAFSTCASHLAVVSLFYCTSLGVYLSSAATHNSHSSATASVMYTVVTP" (SEQ ID  
NO:71).  
BASE COUNT 119 a 182 c 152 g 196 t  
ORIGIN  
25 1 cttttctgac atctgcttgg tctcgaccac tgtcccacag atgtggtga atgtgcagac  
61 acacagcaaa gtcatatcct acgcaggctg cgtcaccag atggacttct ttgtactctt  
121 ttagggctg gacagcttc tcctaccgt gatggcctat gaccggttg tggcatctg  
181 ccaccactg cactacgagg tcaccatgaa cccaggtc tggggctgc tgggtgctg  
241 gtctggatc atgagtccc tgagttcct gtagaaagc ttagtggtgc tgggggtg  
30 301 cttctgtctg gactggaaa tccccactt ttctgtgaa cttaatgaga taatccact  
361 ggcctgttc gacaccttc ttatgacat ggtgatgtat ttctagctc tactgctggg  
421 tgggtgttc ctggctggga tctttactc ttactctaag atagttcct ccgtacgtgc  
481 aatctccta gctcaggga agtataaagc atttccacc tgtgcatctc acctcgcggt  
541 tgtctccta ttactgca caagcctegg ggtgtactg agttctgtg ctacacaaa  
35 601 ctcacactc agcgcaacag cctcggtgat gtacacgtg gtcactccc (SEQ ID NO:70).

## OR50

LOCUS AF127863 642 bp DNA PRI 28-FEB-2000  
40 DEFINITION Eulemur rubriventer EFU84 pseudogene, partial sequence.  
ACCESSION AF127863  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnridae; Eulemur.  
REFERENCE 1 (bases 1 to 642)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
50 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 642)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
55 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

    source            1..642

                      /organism="Eulemur rubriventer"

5                      /db\_xref="taxon:34829"

    gene               <1..>642

                      /gene="EFU84"

                      /pseudo

BASE COUNT    130 a   180 c   138 g   194 t

10    ORIGIN

        1 cttttagac atctgtttg tctctacat ggtcccaaag atgctggtga acatcaagac

        61 acacagcagt catatcctat gcaggctgtg tcaccagat gcactttcc ataactttg

        121 cagagttaga catcttcctc ctgacgggtga tggcctatga ccggtgtgtg gccatctgtc

        181 accccctgca ctacacggcc atcatgaacc ccaggctctg tgaactgtg gttctgctt

15          241 cctggatcat aagtggcccg aattcctgt tacaagtgt aaagggtgtg tggctgtcct

        301 tctgtacaaa ctggaaatc cgtcactttt tctgtgaact tagatactac atcttgccctg

        361 ttgtgacacc tctgttcagt acgtgggtgat acatattgca gctgtggtgc tggctgtttt

        421 tctcttctgt gggatccttt actcttactc tcagatagtt tctccacac gtgcactctc

        481 ctcagctcag gcgaagtgtg aagcatttgc cactgtgtga gctcacctcg cggtgtgtc

20          541 tctattttac tgcacaagcc tcgggggtga ctgagctct gctgtacac acaaccaca

        601 ctccagcgca acagcctcgg tgatgtacat ggtggtcact cc (SEQ ID NO:72).

## OR51

25    LOCUS    AF127864    652 bp    DNA            PRI    28-FEB-2000

        DEFINITION    Eulemur fulvus EFU86 pseudogene, partial sequence.

        ACCESSION    AF127864

        KEYWORDS      .

        SOURCE        Eulemur fulvus.

30          ORGANISM    Eulemur fulvus

                      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

                      Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.

        REFERENCE    1 (bases 1 to 652)

        AUTHORS    Giorgi,D.G. and Rouquier,S.P.

35          TITLE        The olfactory gene repertoire in primates and mouse: evidence for

                      reduction of function in primates

        JOURNAL        Unpublished

        REFERENCE    2 (bases 1 to 652)

        AUTHORS    Giorgi,D.G. and Rouquier,S.P.

40          TITLE        Direct Submission

        JOURNAL        Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

                      Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

    source            1..652

                      /organism="Eulemur fulvus"

45                      /db\_xref="taxon:13515"

    gene               <1..>652

                      /gene="EFU86"

                      /pseudo

50    BASE COUNT    126 a   166 c   152 g   208 t

        ORIGIN

        1 ctttgcagac atctgtttg gttccaccac tgtcccaaag atgctggtga atgtgcagac

        61 acagagcaaa gtatatact acgcaggctg cgtcaccag atggactttt tcatactct

        121 tcagggttg gatatttta tgctgatcat gatggcctat gaccggttg gggccatctg

55          181 tcaccactg cagtacacgg tcatcatgaa cccaggtctc tgtgggctgc tggttgtggt

241 gccctggatc ttgagtgacc tgaattcctt gttacaaagc ttaatgggtg tgcactgtc  
 301 cttttgtaga cacttggaac tcctcacttt ttctgtgaac ttaatcaggt tgccacctt  
 361 gcctgttctg aaaccttctt taatgacatg gtgatgtatc tgatatctgt ggtgctgggt  
 421 ggtggttccc tggctgggac tctttattct ttcttactgc agaatagttt gtcctacacg  
 5 481 tgcaacgtcc tcagctcagg ggaagtataa agcatttccc acctgtgcat ctcacctctc  
 541 agttgtctcc ttatcttctt gcacaatcct aggggtgtac ctcagctctg ctgtaccca  
 601 gaattcgtgc tccagtcgag tagccttggg ggtgtacacg gtggtcactc cc (SEQ ID NO:73).

## OR52

10 LOCUS AF127865 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU87) gene, partial cds.  
 ACCESSION AF127865  
 KEYWORDS .  
 15 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 20 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..649  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>649  
 /gene="EFU87"  
 35 CDS <1..>649  
 /gene="EFU87"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFTSTTIKMLVNIETHSKDISYMGCLTQMYFFMIFAGLD  
 40 NFLTVMAYDRFVAICHPLHYTVIMSPRFCALLVLISWFIMTLVALVHVLILRLTFS  
 LETEIPHFCDLAQILEVAHSDTLNNICMYLSTVLLGVFPVTGILFSYSKIVSSLMR  
 MSSTAGKKKAFSTCGSHLSVVCLFCGTGVGVYLSAVTPSSQSSSIASVMFTVVTP" (SEQ ID  
 NO:75).  
 BASE COUNT 125 a 187 c 134 g 203 t  
 45 ORIGIN  
 1 cttgttgac atctgttca cctccaccac catccccaag atgctgggtg acattgaaac  
 61 acacagcaaa gacatctctt acatgggatg cctcactcag atgtatttt tcatgatttt  
 121 tgctggactg gataattcc tcctgactgt gatggcctat gaccggttg tggccatctg  
 181 ccaccctta cactacacgg tcatcatgag tccccgcttc tggccctcc tggttctcat  
 50 241 atcttggttc atcatgaccc tggttgcctt ggttcatgta ctactgatat tggagctgac  
 301 cttctcttta gaaactgaaa tcccacattt cttctgtgac ctggtcaga ttctcgaggt  
 361 ggccactct gataccctca tcaataacat ctgcatgtac ttgtcactg ttgtgctggg  
 421 cgtgttctt gtcacgggga tcctctctc ctactctaaa attgtctct cctaatgag  
 481 gatgtctcc actgcaggca agaagaaagc attttccacc tgtgggtctc acctctctgt  
 55 541 ggtctgcttg ttctgcggaa caggagtggg ggtctatctc agttctgctg tgacccttc

601 ttccagagc agcagcattg cctcagtgat gttcacggtg gtcaccccc (SEQ ID NO:74).

### OR53

5 LOCUS AF127866 646 bp DNA PRI 28-FEB-2000  
DEFINITION Macaca sylvanus MSY1 pseudogene, partial sequence.  
ACCESSION AF127866  
KEYWORDS .  
SOURCE Barbary ape.  
10 ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
REFERENCE 1 (bases 1 to 646)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 646)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..646  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>646  
/gene="MSY1"  
30 /pseudo  
BASE COUNT 115 a 186 c 144 g 201 t  
ORIGIN  
1 cttgttgac atctgtttta tctccaccac cgtccccagg atgctgatga acatccaggc  
35 61 atggagcaaa gacatctcct acgtgggggtg cctcactcag gtgtatttt taatgatgt  
121 tgctggaatg gatacttcc tactggccat gatggcctat gaccggtttg tggccatctg  
181 ccacccctg cactacacgg tcatcatgaa cccctgcctc tgggcctcc tggttctggc  
241 atctgattc atcatttat gggctcctc agttcatatt ctactgatga agagtttgat  
301 ctccatagcg actgagattc cgcatttct ctgtgaactg gtcagggtcc tcaagggtgc  
361 ccgctctgat actctcctcg ttaacattgt ctgtatgtg gccacagcac tgctgggtgt  
40 421 gcttctgtga gctgggatac tcttctcta ctctcagatc gtctcctct taatgaggat  
481 gtcctccacc gagggcaagt gcaaagcctt ttccacctgt gggctcacc tctgtgtggt  
541 ctccctgttc tatggaacag gactgggggt ctatctcagt tctgtgtga cccattcttc  
601 ccagagcagc tccatggcct cagtgatgta caccatggtc accccc (SEQ ID NO:76).

### 45 OR54

LOCUS AF127867 649 bp DNA PRI 28-FEB-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY12) gene, partial cds.  
ACCESSION AF127867  
50 KEYWORDS .  
SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
55 Macaca.

REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>649  
 /gene="MSY12"  
 CDS <1..>649  
 /gene="MSY12"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDVCFVSTTVPKMLVNIQTQNKVITYAGCISQMCFFIFFAGLD  
 IFMLTVMAYDRFVAICHPLHYTVTMNPRLCGLLVLASWIMSALNSSLQSLMVLHLSFC  
 ADLEIPHFCELNQVIHLTCSDTFLNDMMVYLSAVLLGGGCLIGILYSYSKIVSSIHA  
 ISSVQGKYKAFSTCASHLSVVSFLFYCTILGVYLSSAATHSSHASAAVSVMYTVVTP" (SEQ ID  
 NO:78).  
 BASE COUNT 132 a 173 c 138 g 206 t  
 ORIGIN  
 1 ctctgtagac gtctgttttg tgcaccacac tgcctcgaag atgctggtga acatccagac  
 61 acagaacaaa gtcacacacat atgcaggctg catcagccag atgtgctttt tcatattctt  
 121 tgcaggattg gacatcttta tgcagaccgt gatggcctac gacagggttg tggccatctg  
 181 tcacccctg cactacacgg tcaccatgaa cccagggctc tgggactgc tggttctggc  
 241 gtctctgcat atgagtgcgc tgaattctc attgcaaagc ttaatggtat tgcacctttc  
 301 ctctgtgca gacttggaaa tccccactt ttctgtgaa cttaatcagg tcacccacat  
 361 tacctgtctt gacacttttc ttaatgacat ggtgatgtat ttgtcagctg tgcgtctggg  
 421 tgggggatgt ctcattggga tcctttactc ttactctaag atcgtctcct ctatacatgc  
 481 aatctcatca gttcagggga agtacaaggc atttccacc tgtgcatttc acctctcggt  
 541 tgcctcccta tttattgta caatcctagg tgtgtacctt agttctgctg caaccacag  
 601 ctcacacgca agtctgctgag tctcggtgat gtacactgtg gttaccccc (SEQ ID NO:77).  
**OR55**  
 LOCUS AF127868 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY16) gene, partial cds.  
 ACCESSION AF127868  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 5 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 10 gene <1..>649  
 /gene="MSY16"  
 CDS <1..>649  
 /gene="MSY16"  
 /codon\_start=2  
 15 /product="olfactory receptor"  
 /translation="LADIGFTSTTVPKMLVNIQAQSN AISYAGCISQMYFFMVFGGID  
 TFLTVMAYDRYVAICHPLYYPVIMNPRLCGLLVLSWFLSLSYSLLMLQLSFC  
 TSWVIQHFYCELAQALTLACSDTHINYILLYVVTGLLGFVPFSGILFSYTQIVSSILR  
 ISSTDGKHKAFSNCGSHLSVVFLFYGTGLGVYLSSNASSSSWRGMVASVMYTVVTP" (SEQ  
 20 ID NO:80).  
 BASE COUNT 115 a 195 c 140 g 199 t  
 ORIGIN  
 1 cttggctgac atcggtttca cctccaccac agtccccaag atgctggtga acatccaggc  
 61 gcagagcaat gccatcagct atgcaggctg catctcccag atgtattttt tcatggtttt  
 25 121 tggaggcata gacacatttc tctcaccgt gatggcctat gaccggtatg tggccatctg  
 181 tcacccctcg tactaccctg tcattatgaa cccccgcctc tgtggcctgc tggttcttgt  
 241 gtccctgttc ctcagcttgt catactccct gatccagagt ctgtgatgc tgcagttgtc  
 301 cttttgacc agttgggtca ttcagcactt ttactgcgag ctgctcagg ccctcacgct  
 361 tgccctgctca gacacacaca tcaattacat cctgctctac gtggtgaccg gccttctggg  
 30 421 ttttggccc ttctcaggaa tcctttctc ctacacccaa attgtctcct ccactcctgag  
 481 aatctcatcc acagatggga aacacaaagc cttttctaac tgcggatctc atctgtctgt  
 541 ggtttttta ttctatggga caggccttgg tgtgtatctt agttccaatg catcgtctc  
 601 ttctggcggg ggcattgggtg cctcggtcat gtacactgtg gtcaccccc (SEQ ID NO:79).  
 35 **OR56**  
 LOCUS AF127869 647 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus MSY2 pseudogene, partial sequence.  
 ACCESSION AF127869  
 40 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 45 Macaca.  
 REFERENCE 1 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 55 Montpellier Cedex 5 34396, France

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FEATURES             Location/Qualifiers
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                        /organism="Macaca sylvanus"
                        /db_xref="taxon:9546"
5     gene             <1..>647
                        /gene="MSY2"
                        /pseudo
BASE COUNT    131 a  173 c  137 g  206 t
ORIGIN
10     1 cttcgtagac gtctgtttg tgcaccac tgtcccgaag atgtggtga acatccagac
        61 acagaacaaa gtcacacct atgcaggctg catcagccag atgtgcttt tcatattctt
        121 tgcaggattg gacaccttta tctgaccgt gatggcctac gacaggtttg tggccatctg
        181 tcacctctg cactacacgg tcaccatgaa ccccaggctc tgtggactgc tggttctggc
        241 gtctgatca tgagtccct gaattctca ttgcaaagct taatggtatt gcacatttcc
15     301 ttctgtcag acttggaat tcccacttt ttctgtgaac ttaacaggt catccacctt
        361 acctgttct acacttttct taatgacatg gtgatgtatt tgcagctgt gctgctgggt
        421 gggggatgc tcattgggat ctttactct tactctaaga tcgtctcctc tatacttgca
        481 atctcatcag ttcaggggaa gtacaaggca tttccacct gtgcatcga cctctcggtt
        541 gtctcctat ttattgtaca atcctaggtg tgtacctag ttctgtgca acccacagct
20     601 cacacgaag tgctgcagtc tcggtgatgt acactgtgtg taccccc (SEQ ID NO:81).

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## OR57

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LOCUS   AF127870   649 bp   DNA       PRI    28-FEB-2000
25  DEFINITION   Macaca sylvanus olfactory receptor (MSY4) gene, partial cds.
    ACCESSION   AF127870
    KEYWORDS
    SOURCE      Barbary ape.
    ORGANISM    Macaca sylvanus
30      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
        Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;
        Macaca.
REFERENCE   1 (bases 1 to 649)
    AUTHORS   Giorgi,D.G. and Rouquier,S.P.
35  TITLE      The olfactory gene repertoire in primates and mouse: evidence for
        reduction of function in primates
    JOURNAL   Unpublished
REFERENCE   2 (bases 1 to 649)
    AUTHORS   Giorgi,D.G. and Rouquier,S.P.
40  TITLE      Direct Submission
    JOURNAL   Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
        Montpellier Cedex 5 34396, France
FEATURES             Location/Qualifiers
    source             1..649
45      /organism="Macaca sylvanus"
        /db_xref="taxon:9546"
    gene             <1..>649
        /gene="MSY4"
    CDS               <1..>649
50      /gene="MSY4"
        /codon_start=2
        /product="olfactory receptor"
        /translation="FIDICFVSTTVPKMMVNIQTQSRVITYAGCITQMCFFIFFVGLD
        IFMLTVMAFDRFVAICHPLHYTVTMNPRLSGLLVLASWIMSALNSSLQSLIVLRLSFC
55      TDLEIPHFFCELNQVVHLACSDTFLNDMVMYLASALLGCGPLSGILYSYSKIVSSIRG

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ISSAQGKYRAFSTCASHLSVVSLFYGTLLGVYFSSAATRNHSSAAASVMYTVVTP" (SEQ ID NO:83).

BASE COUNT 125 a 179 c 142 g 203 t

ORIGIN

5 1 cttcatagac atctgttttg tgtccaccac tgtcccgaag atgatggatga acatccagac  
61 acagagcaga gtcacacct atgcaggctg catcaccag atgtgctttt tcataattctt  
121 tgtgggactg gatatcttta tgctgaccgt gatggccttt gaccggtttg tggccatctg  
181 tcacccctg cactacacgg tcacatgaa cccaggctc agtgggctgc tggttctggc  
241 gtcctggatc atgagtggcc tgaattcctc gttacaaagc ttaatatgctc tgcggcttc  
10 301 cttctgcaca gacttggaaa tccccactt ttctgtgaa cttaatcagg tggccacct  
361 tgcctgtctt gacaccttc ttaatgacat ggtgatgtat ttggcatctg cactgctggg  
421 ctgtggctcc ctctctggga tctttattc ttattctaag atcgtttct ccatacgtgg  
481 aatctcatca gctcaggga agtacagggc attttccacc tgtcatctc acctctcagt  
541 tgtctcttta tttatgga cgctcctagg agtgtacttt agttctgctg caaccgtaa  
15 601 ctcacactca agtgcctcag cctcggtgat gtacaccgtg gttaccccc (SEQ ID NO:82).

**OR58**

LOCUS AF127871 646 bp DNA PRI 28-FEB-2000

20 DEFINITION *Macaca sylvanus* olfactory receptor (MSY6) gene, partial cds.

ACCESSION AF127871

KEYWORDS .

SOURCE Barbary ape.

ORGANISM *Macaca sylvanus*

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..646

40 /organism="Macaca sylvanus"  
/db\_xref="taxon:9546"

gene <1..>646  
/gene="MSY6"

CDS <1..>646

45 /gene="MSY6"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FTDLFFVTNTIPKMLVNLQSQNKAI SYAGCLTQLYFLVSLVALD  
NLILAVMAYDRYVAICCP LHYTTAMSPKLCILLSLCWVLSVLYGLIHTFLMTTVTFC  
50 GSRKIH YIFCEMYVLLRLACSDTQINH TVLIATGCFILIPFGFMIISYVLIVRAILR  
IPSVSKKYKAFSTCASHLG VVSLFYGTLRMVYLKPLHTYSVKDSVATVMYAVVTP" (SEQ ID  
NO:85).

BASE COUNT 134 a 196 c 126 g 190 t

ORIGIN

55 1 cttcactgac ctctcttttg tcaccaaac aatcccgaag atgctggtga acctccagtc



61 ccagaacaaa gccatctcct atgcagggtg tctgacacag ctctacttcc tgggtcctt  
 121 ggtggccctg gacaacctca tctggctgt gatggcgtat gaccgctatg tggccatctg  
 181 ctgccccctc cactacacca cagccatgag ccctaagctc tgtatcttac tctttcctt  
 241 gtgtgggtc ttatctgtgc tctatggcct catacacacc ttctcatga ccacgggtgac  
 301 ctctgtggg tcacgaaaaa tccactacat ctctgtgag atgtatgtat tgctgaggct  
 361 ggcatgttc gacactcaga ttaatcacac agtgtgtatt gccacaggct gctttatctt  
 421 cctcattccc ttggattca tgaatcattc ctatgtgtg attgtcagag ccatactcag  
 481 aataccctca gtctctaaga aatacaaacg ctctccact tggcctccc attgggtgt  
 541 agtctccctc ttctatggga cacttcgtat ggtatacctg aagccccctc atactactc  
 601 tgtgaaggac tcagtagcca cagtgtgta tgcgggtgtg acacc (SEQ ID NO:84).

## OR59

LOCUS AF127872 649 bp DNA PRI 28-FEB-2000  
 15 DEFINITION *Macaca sylvanus* olfactory receptor (MSY7) gene, partial cds.  
 ACCESSION AF127872  
 KEYWORDS  
 SOURCE Barbary ape.  
 ORGANISM *Macaca sylvanus*  
 20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 35 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>649  
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 CDS <1..>649  
 40 /gene="MSY7"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="WVDICFSICIIIPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD  
 TLLLTVMAYDRFVAVCHPLHYVTIMNPRLCGLLVFVTWLVGVMTPLLHISLLTHLTFC  
 45 KDFEIPHFCELTHILQLACSDTLNSTLIYVMTGVLGVFPLLGIIFSYSRIASSIRK  
 MSSSGGKEKALSTCGSHLSIVSLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
 NO:87).  
 BASE COUNT 129 a 190 c 127 g 203 t  
 ORIGIN  
 50 1 ctgggtgac atctgttca gcatctgcat catccccaag atgctggtga acatccagac  
 61 caagaacaaa accatctctt acatggactg cctcaccag gtctatttct ccatgtttt  
 121 tctattctg gacacgctac tctgaccgt gatggcttat gaccggttg tggcgtctg  
 181 ccacccctg cactatgtaa ccatcatgaa cccccgctc tgcggcctcc tggttttgt  
 241 cacgtggctc attgtgtca tgacaccct cctccatatt tctctgtga cgcattcaac  
 55 301 ctctgtaaa gatttgaaa ttccacattt ttctcgcaa ctgacacaca tctccagct

361 ggcctgctct gataccttcc tgaacagcac gttgatatat gttatgacag gtgtgctggg  
 421 cgttttccc ctcttgga tcatttctc ttattcacga atcgctcat ccataaggaa  
 481 gatgtccta tctgggggaa aagagaaagc actttctacc tgtggctctc accttccat  
 541 cgtttcttta tttatggga caggcattgg ggtccatttc acttctgagg tgactcattc  
 5 601 ttcccagaac atctccgtgg cctcgggtgat gtacacgggtg gttaccccc (SEQ ID NO:86).

## OR60

LOCUS AF127873 645 bp DNA PRI 28-FEB-2000  
 10 DEFINITION *Macaca sylvanus* MSY8 pseudogene, partial sequence.  
 ACCESSION AF127873  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM *Macaca sylvanus*  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 30 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
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 /pseudo  
 35 BASE COUNT 117 a 185 c 142 g 201 t  
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 1 cttgttgac atctgtttta tctccaccac cgtccccagg atgctgatga acatccaggc  
 61 atggagcaaa gacatctcct acgtgggggtg cctcactcag gtgtatttt taatgatgtt  
 121 tgctggaatg gatactttcc tactggccat gatggcctat gaccggtttg tggccatctg  
 40 181 ccacccccctg cactacacgg tcatcatgaa cccctgcctc tgtggcatcc tggttctggc  
 241 atcttgatic atcattttat gggtctccct agttcatatt ctactgatga agagtttgat  
 301 ctccatagcg actgagattc cgcatttctt ctgtgaactg gctcagggtcc tcaagggtgcc  
 361 cgtctgata ctctctcgt taacattgtc ttgtatgtgg ccacagcact gctgggtgtg  
 421 ctctctgtag ctgggatcct ctctcttac tctcagatcg tctctcctt aatgaggatg  
 45 481 tctccaccg agggcaagta caaagccttt tccacctgtg ggtctcacct ctgtgtggtc  
 541 tcttgttct atggaacagg acttggggtc tatctcagtt ctgctgtgac ccatttctcc  
 601 cagagcagct ccattggcctc agtgatgtac accatgggtca ccccc (SEQ ID NO:88).

## OR61

50 LOCUS AF127874 649 bp DNA PRI 28-FEB-2000  
 DEFINITION *Macaca sylvanus* olfactory receptor (MSY9) gene, partial cds.  
 ACCESSION AF127874  
 KEYWORDS .  
 55 SOURCE Barbary ape.

ORGANISM *Macaca sylvanus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.

5 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

15 FEATURES Location/Qualifiers  
 source 1..649  
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 20 CDS <1..>649  
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 25 /translation="LADIGFTSTTVPKMLVNIQAQSN AISYAGCISQMYFFMVFGGID  
 TFLTVMAYDRYVAICHPLYYPVIMNPRLCGLLVLSWFLSLSYSLIQSLLMLQLSFC  
 TSWVIQHFYCELAQALTLACSDTHINYILLYVVTGLLGFVPFSGILFSYTIQIVSSILR  
 ISSTDGKHKAFSTCGSHLSVVFIFYGTGLGVYLSSNASSSSWRGMVASVMYTVVTP" (SEQ  
 ID NO:90).

30 BASE COUNT 114 a 196 c 140 g 199 t  
 ORIGIN  
 1 cttgctgac atcggttca cctccaccac agtccccaag atgctggtga acatccaggc  
 61 gcagagcaat gccatcagct atgcaggctg catctcccag atgtatttt tcatggttt  
 121 tggaggcata gacacattc tctcacogt gatggcctat gaccggtatg tggccatctg  
 35 181 tcacccctg tactaccctg tcattatga cccccgcctc tgtggcctgc tggttctgt  
 241 gtccctggtc ctcagctgt cactacccct gatccagagt ctgtgatgc tgcagttgtc  
 301 cttttgcacc agttgggtca ttcagcactt ttactgcgag ctgtgcagg ccctcacgct  
 361 tttctgctca gacacacaca tcaattacat cctgctctac gtggtgaccg gccttctggg  
 421 tttgtgcc ttctcaggaa tcttttctc ctacaccaa attgtctct ccatectgag  
 40 481 aatctcatcc acagatggga aacacaaagc cttttctacc tgcggatctc atctgtctgt  
 541 gggttttta ttctatggga caggccttgg tgtgtatct agttccaatg catcgtctc  
 601 ttctggcgg ggcattggtg cctcggtcat gtacactgtg gtcaccccc (SEQ ID NO:89).

**OR62**

45 LOCUS AF127875 649 bp DNA PRI 28-FEB-2000  
 DEFINITION *Callithrix jacchus* olfactory receptor (CJA21) gene, partial cds.  
 ACCESSION AF127875  
 KEYWORDS .

50 SOURCE *Callithrix jacchus*.  
 ORGANISM *Callithrix jacchus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; *Callithrix*.

55 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..649  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
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 15 CDS <1..>649  
 /gene="CJA21"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICVTSTTLPKTLSNIQTHSKVITYAGCVTQLYFFVLFIGLD  
 20 SLLPTVMAYDRFVAICHPLHYTVIMNPQFCGLLVLSWIMSALHSLTESLMVYPLLFC  
 TDLKIPQFFCEIHQIIQFACSDTFLNNLVMYLSVLLGGGFLAGILYSYSKIASSIRA  
 ISSAEGKYKAFSTCASHLSVVSIFYCTGLGVYLSAATHSSLSSAAASVMYTVVTP" (SEQ ID  
 NO:92).  
 BASE COUNT 137 a 184 c 133 g 195 t  
 25 ORIGIN  
 1 cttgtggac atctgtgta cctccaccac acttccgaag acactgtcaa acatccagac  
 61 acacagcaaa gtcacacct atgcaggctg cgtcaccag ttgtactct ttgtactct  
 121 catagggtg gacagcttac tcccgacct gatggcctat gaccggttg tggccatcg  
 181 tcacccctg cactacacgg tcatcatgaa cctcagttc tgtggactgc tggttctggt  
 30 241 gtctggatc atgagtgcct gcattctt gacagaaagc ttaatggtat accactgct  
 301 cttttgaca gactgaaaa tccccagtt tttctgtaa attcatcaga taattcaatt  
 361 tgctgttct gacaccttc ttaataacct ggtgatgtat ttgtcaactg tgctcctggg  
 421 cgggtgtccc ctgctggga tcctgtactc ttactctaag atagcttct ctatacgtgc  
 481 aatctcatca gctgagggga agtacaaggc atttccacc tgtcatctc acctctcagt  
 35 541 tgtctctta tttattgta caggcctagg ggtgtacctg agttctgct caaccacag  
 601 ctcacttca agcgcagcag cctcggtgat gtacacagtg gtcacccc (SEQ ID NO:91).

## OR63

40 LOCUS AF127876 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA22) gene, partial cds.  
 ACCESSION AF127876  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 45 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

5 /organism="Callithrix jacchus"  
/db\_xref="taxon:9483"

gene <1..>649  
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CDS <1..>649

10 /gene="CJA22"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LVDICFTSTTVPKILVNIQE QSGTISYAGCIAQMYFFMVFGGMD  
TFLTVMAYDRYVAICHPLSYPIVNPRLCGLLVLSWFLSLSYSLIQSLLMLRLSFC  
15 TSWVIQHFYCELAQVLTACSDTHVNYILLYMVTGLLGCVPFSGILFSYIQIVSSILR  
IPSTDGKHKAFSTCGSHLSVVSIFYGTGLGVYLSNASSSSWWGMVASAMYTIVVTP" (SEQ  
ID NO:94).

BASE COUNT 112 a 193 c 140 g 204 t

ORIGIN

20 1 cttggttgac atctgttca cctccaccac agtccccaag attctggtga acatccagga  
61 gcagagtgg accatcagct atgcaggctg cattgccag atgtatttt tcatggttt  
121 tggaggcatg gacacattc tctcactgt gatggcctat gaccggtatg tggctatctg  
181 tcacccctg tctaccctg tcattgtaaa ccccgccctc tgcggcctgt tggttcttgt  
241 gtctgtgttc ctcagcttgc cactactcct gatccagagt ctgttgatgc tgcggctatc  
25 301 cttctgcacc agttgggtga ttcagcactt ttactgtgag ctgtctcagg ttctcagct  
361 tgcctgtcta gacacacatg tcaattacat cctgctctac atggtgaccg gccttctggg  
421 ctgtgttccc ttctcaggga tcttttctc ctacatcaa attgtctcct ccatcctgag  
481 aatcccatcc acagatggga aacataaagc cttttctacc tgtggatctc atctgtctgt  
541 ggtttcttta ttctacggga caggccttgg tgtctacctt agctccaatg cctcgtcctc  
30 601 ttctgtgtgg ggcattggtg cctcagccat gtacacagtg gtcaccct (SEQ ID NO:93).

## OR64

LOCUS AF127877 649 bp DNA PRI 28-FEB-2000

35 DEFINITION Callithrix jacchus olfactory receptor (CJA23) gene, partial cds.

ACCESSION AF127877

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for

45 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

50 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

55 /organism="Callithrix jacchus"  
/db\_xref="taxon:9483"

gene <1..>649  
 /gene="CJA23"  
 CDS <1..>649  
 /gene="CJA23"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FTDICFTTVIVPRMLVNFLSGTKVIPYMGCLVQMYFFMAFGNTD  
 SYLLASMAIDRLVAICNPLHYDVAMNPRHCLLMLLGSCSISHLHSLFRVLLMSHLSFC  
 ASHVIKHFFCDTQPVLKLSGSDTSSSQMVVMTETLAVIVTPFLCIIFSYLRIITVLR  
 IPFAAGKWRAFSTCGSHLTVVALFYGSIYVYFRPLSMYSVVKDRVATVMYTVVTP" (SEQ

ID NO:96).

BASE COUNT 126 a 192 c 139 g 192 t

ORIGIN

1 ttacaggat atctgctca caacagtcag agtgcccagg atgctgggga attttctatc  
 61 agggacaaag gttatccctt acatgggctg cctgggtccaa atgtacttct tcatggcctt  
 121 tgggaacact gacagctacc tgctggcctc tatggccatc gaccggctgg tggccatctg  
 181 caacccttta cactatgatg tggctatgaa ccccgccatc tgcctactca tgctattggg  
 241 ttcttgagc atctccacc tacattccct gttccgggtg ctacttatgt ctcacctgtc  
 301 ttctgtgcc tccacgtca ttaagcactt ttctgtgac acccagcctg tgctaaagct  
 361 gtctgtctt gacacgtctt ccagccagat ggtgggtcatg actgagactt tagctgtcat  
 421 tgtgaccccc ttctgtgta tcatctctc ctacctgga atcatcatca ctgtgtcag  
 481 aatcccttt gcagctggga agtggagggc cttctctacc tgggctccc acctcactgt  
 541 agtagccctt ttctacggga gtatatatta tgtctatgtt aggccctgt ccatgtactc  
 601 agtggggaag gaccgagtag ccacagttat gtacacagta gtgacacc (SEQ ID NO:95).

## OR65

LOCUS AF127878 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA24) gene, partial cds.  
 30 ACCESSION AF127878  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 35 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 40 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 45 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 50 gene <1..>649  
 /gene="CJA24"  
 CDS <1..>649  
 /gene="CJA24"  
 /codon\_start=2  
 55 /product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAVL  
 VFMLTVMAYDRYVAICHPLHYTVTINPRCLGLVLASWILSALNSSLQTLIVRLSFC  
 TDLEIPHFCELNQVIHLACSDTFLNDVVMYLA AVLGGGPLAGILYSYSKIVSSIRA  
 ISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP" (SEQ ID  
 5 NO:98).  
 BASE COUNT 136 a 177 c 134 g 202 t  
 ORIGIN  
 1 cttttagac atctgtttg tgtctaccac tgcctcaaag atgtggtaa atatccagac  
 61 acacagcaaa gtcacacct tgcaggctg catcaccag ataggccatt gcctactctt  
 10 121 tgcagtattg gacgtcttta tgctgactgt gatggcctat gaccggtatg tggccatctg  
 181 tcaccactg cactacacag tcaccattaa cccagactg tgggactgc tggttctggc  
 241 atctggatc ctgagtgcct tgaattcctc attacaaacc ttaatagtc tgcggcttgc  
 301 ctctgcaca gacttgaaa tccccactt ttctgcgaa ctaatcagg tcatccacct  
 361 tgcctgttct gacactttc ttaatgatgt ggtgatgtat ttggccgctg tgctgctggg  
 15 421 ggggtgtccc ctgcaggga ttcttactc ttacttaag atagtttct ccatcgtgc  
 481 aatctcatca gctcaggga agtacaaggc atttccacc tgtgtatctc acatctaat  
 541 tgtctctta tttatgta cactcctagg tgtgtacctt agttctgctg caactggcaa  
 601 ctcacatca agagctgcag cctcgggtgat gtacactgtg gtcaccccc (SEQ ID NO:97).  
 20 **OR66**  
 LOCUS AF127879 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA25) gene, partial cds.  
 ACCESSION AF127879  
 25 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 30 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 35 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 40 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 gene <1..>649  
 45 /gene="CJA25"  
 CDS <1..>649  
 /gene="CJA25"  
 /codon\_start=2  
 /product="olfactory receptor"  
 50 /translation="FADICFTSTTVPKMLVDIQTQSKMITFAGCLTQIFFFVAFGCLD  
 NLLLTVMAYDRFVAICHPLHYAVIMNPRCLRLVLGWCISVMVSLLETILTILRLSFC  
 TNMEIPHFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR  
 VSPAQQQHKAFSTCGSHLSVVTLFYGTGLGVYLSLAATPSSRTSLMASVMYTMVTP" (SEQ  
 ID NO:100).  
 55 BASE COUNT 130 a 183 c 136 g 200 t

# ORIGIN

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1 cttgtctgac atctgtttca catccacgac cgtcccaaag atgctggtgg atatccaaac
61 acaaagcaaa atgatcactt ttgagggtg cctcaccag atttttttt tegtgcatt
121 tggatgcctg gacaatttgc tcttgaccgt gatggcctat gaccgggtcg tggccatctg
181 tcacccctcg cactacgagg tcatcatgaa cccccggctc tgtagactgc tagttctggg
241 gtctggtgc atcagtgtca tggtttctct gctcgagacc ttgaccattt tgaggctgtc
301 cttctgcaca aacatggaaa tcccacactt tttttgat gttctgaag tcctgaagct
361 cgcctgttct gaaaccctcg tcaataaaat cgtgatgtat ttgtgacaa ttgcaatggg
421 tgttttctct ctctctggaa tcctatactc ttattctcag attttctct ccatcctgag
481 agtatcacct gcccaaggcc agcacaaagc cttttccacc tgtgggtctc acctctcagt
541 ggccaccctg ttctatggca cgggccttgg ggtatatctc agtcttcag ctacaccatc
601 ttctaggaca agtctgatgg cctcggtgat gtacaccatg gtcaccccc (SEQ ID NO:99).

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## OR67

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15 LOCUS AF127880 649 bp DNA PRI 28-FEB-2000
DEFINITION Callithrix jacchus olfactory receptor (CJA26) gene, partial cds.
ACCESSION AF127880
KEYWORDS
20 SOURCE Callithrix jacchus.
ORGANISM Callithrix jacchus
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
REFERENCE 1 (bases 1 to 649)
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 649)
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
35 source 1..649
/organism="Callithrix jacchus"
/db_xref="taxon:9483"
gene <1..>649
/gene="CJA26"
40 CDS <1..>649
/gene="CJA26"
/codon_start=2
/product="olfactory receptor"
/translation="LADIGLTSTTVPRITVNIQTHSRVIAYASCLTQMSFSIFFVCME
45 DMLLAVMAYDRFVAICHPLHYPVIMSPRLCGFLVLVSAFLSLLISQVHNLIVLQFSCF
KDIKISNFFCDPSQLLTLACSDTFVNNNIVMNFFAAVFGFLPISGIFLSYYKIVSSIL
RVPSSSGKYKAFSTCSSHLAVVCLFYGTVLGVYLGSSVSSPRKRVVTSVMYTVVTP" (SEQ
ID NO:102).
BASE COUNT 138 a 161 c 124 g 226 t
50 ORIGIN
1 cttggtctgac attggttga cctccaccac cgtccccagg acaattgtga acattcaaac
61 tcacagcaga gtcacgcct atgcaagctg cctgacacag atgtctttt caatctttt
121 tgtgtgtatg gaagacatgc tccttctgt gatggcctat gaccggttgg tggccatctg
181 tcacccctcg cactatccag tcacatgag cccacgactc tgtggcttct tagtgttgg
55 241 gtctgctttt cttagccttt taatatccca ggtgcacaat ttgattgtct tacaattttc

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301 ttgcttcaaa gatataaaga ttctaatTT ctctgtgac ccttctcaac tctcacact  
 361 tgcttggtcc gacacgttg tcaataacaa catagtcatg aatttcttg ctgctgtatt  
 421 tggttttctt cccatctcag ggatctttt gtcttactat aaaattggtt cctccattct  
 481 gagagtcca tcatcaagtg ggaagtataa agccttctct acctgtagct ctcacctggc  
 5 541 agttgttgc ttatttatg gaacagtct tggagtgtac cttgggtcat cagtgtcatc  
 601 ccccggaag agagtgtga cctcagtgt gtacacagt gtcactccc (SEQ ID NO:101).

## OR68

10 LOCUS AF127881 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA62) gene, partial cds.  
 ACCESSION AF127881  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 15 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 30 /organism="Callithrix jacchus"  
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 gene <1..>649  
 /gene="CJA62"  
 CDS <1..>649  
 35 /gene="CJA62"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFVSTTVPKTLVNIQTHSKVITFAGCITQIGHCLLFAVLD  
 VFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
 40 TDLEIPHFFCVLNQVIHLACSDTFLNDVVMYLA AVL LGGGPLAGILYSYKIVSSIRA  
 ISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP" (SEQ ID  
 NO:104).  
 BASE COUNT 133 a 179 c 135 g 202 t  
 ORIGIN  
 45 1-ctttagtagac atctgttttg tgtctaccac tgtcccgaag acgctggtaa atatccagac  
 61 acacagcaaa gtcacacct ttgcaggctg catcaccag ataggccatt gcctcctctt  
 121 tgcatgtatt gacgtcttta tgctgactgt gatggcctat gaccggtatg tggccatctg  
 181 tcaccactg cactacacag tcaccataa cccagactg tgtggactgc tggttctggc  
 241 atcctggatc ctgagtgtccc tgaattctc attacaaacc ttaatagtgc tgcggcttcc  
 50 301 ctctgcaca gacttgaaa tccccactt ttctgcgta cttaatcagg tcatccacct  
 361 tgcctgtct gacactttc ttaatgatgt ggtgatgtat ttggccgctg tgctgtggtg  
 421 ggggtgtccc ctgcaggga ttcttactc ttactctaag atagtttct ccatcgtgc  
 481 aatctcatca gctcaggga agtacaaggc atttccacc tgtgtatctc acatctaat  
 541 tgtctcctta ttatggta cactctagg tgtgtacct agttctgtg caactggcaa  
 55 601 ctacattca agagctgcag cctcgggtgt gtacactgtg gtcaccccc (SEQ ID NO:103).

## OR69

LOCUS AF127882 649 bp DNA PRI 28-FEB-2000  
5 DEFINITION Callithrix jacchus olfactory receptor (CJA80) gene, partial cds.  
ACCESSION AF127882  
KEYWORDS .  
SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
15 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Callithrix jacchus"  
25 /db\_xref="taxon:9483"  
gene <1..>649  
/gene="CJA80"  
CDS <1..>649  
/gene="CJA80"  
30 /codon\_start=2  
/product="olfactory receptor"  
/translation="FTDICFTTVIVPRMLVNFLSETKVISYMGCLVPMYFFMAFANTD  
SYLLASMAIDRLVAICNPLHYDVAMNSRRCLLMLLGSCSISHLHSLFRVLLMSRLSFC  
ASHVIKHFFCDTQPVLKLSGSDTSSQMVVMTETLAVIVTPFLCIIFSYLRIITVLR  
35 IPSAAGKWRAFSTCGSHLTVVALFYGSHIYVYFRPLSMYSVVKDRVATVMYTVVTP" (SEQ  
ID NO:106).  
BASE COUNT 123 a 194 c 139 g 193 t  
ORIGIN  
1 ttcacggat atctgctca caacagtc atggtcccagg atgctggtga atttctatc  
40 61 agagacaaag gttatctct acatgggctg cctggtccca atgtactct tcatggcctt  
121 tgcgaacact gacagtcacc tgctggcctc tatggccatc gaccggctgg tggccatctg  
181 caaccctta cactatgatg tggctatgaa ctccggcgt tgcctactca tgctattggg  
241 ttcttgagc atctccacc tacattcct gttccgggtg ctacttatgt ctgcctgtc  
301 ttctgtgcc tcccagtc ttaagcact ttctgtgac acccagcctg tgctaaagct  
45 361 gtcctgtct gacagtcct ccagccagat ggtgggtcatg actgagacct tagctgtat  
421 tgtgaccccc ttctgtgta tcatcttc ctacctgca atcatcatca ctgtgtcag  
481 aatccctct gcagccggga agtggagggc cttcttacc tgtggctccc acctcactg  
541 agtagccct ttctacggga gtattattt tctctattt aggccctgt ccatgtactc  
601 agtgggaag gaccgagtag ccacagttat gtacacagta gtgacccc (SEQ ID NO:105).

## OR70

LOCUS AF127883 649 bp DNA PRI 28-FEB-2000  
55 DEFINITION Callithrix jacchus olfactory receptor (CJA81) gene, partial cds.  
ACCESSION AF127883

KEYWORDS .  
SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..649  
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/db\_xref="taxon:9483"

gene <1..>649  
/gene="CJA81"

CDS <1..>649  
/gene="CJA81"  
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/product="olfactory receptor"  
/translation="FADICFTSTTVPKMLVDIQTQSKMITFAGCLTQIFFFVAFGCLD  
NLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLVLGSWCISVMVSLLETILTILRLSFC  
TNMEIPHFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR  
VSPAQQQHKAFASTCGSHLSVVTLFYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ

ID NO:108).

BASE COUNT 130 a 184 c 136 g 199 t

ORIGIN  
1 ctttgctgac atctgcttca catccacgac cgtcccaaag atgctggtgg atatccaaac  
61 acaaagcaa atgatacatt ttgcagggtg cctcaccag attttttt tcgttgcat  
121 tggatgcctg gacaatttgc tcttgaccgt gatggcctat gaccggttcg tggccatctg  
181 tcacccctg cactacgcgg tcatcatgaa ccccggtc tgtagactgc tagttctggg  
241 gtctgtgtgc atcagtgtca tggtttctct gctcgagacc ttgaccattt tgaggctgtc  
301 ctcttgaca aacatggaaa tccacactt ttttgtgat gttctgaaag tctgaagct  
361 cgctgttct gaaaccctcg tcaataaaat cgtgatgtat ttgtgacaa ttgcaatggg  
421 tgttttctct ctcttgga tctatactc ttattctcag atttctct ccatcctgag  
481 agtatcacct gcccaaggcc agcacaagc ctttccacc tgtgggtctc acctctcagt  
541 ggccaccctg ttctatggca cgggccttgg ggtatatctc agttctgcag ctacaccatc  
601 ttctaggaca agtctgatgg cctcggtgat gtacaccatg gtcaccccc (SEQ ID NO:107).

**OR71**

LOCUS AF127884 649 bp DNA PRI 28-FEB-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA82) gene, partial cds.  
ACCESSION AF127884

KEYWORDS .  
SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
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 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 gene <1..>649  
 15 /gene="CJA82"  
 CDS <1..>649  
 /gene="CJA82"  
 /codon\_start=2  
 /product="olfactory receptor"  
 20 /translation="FADICFTSTTVPKMLVGIQTQSKMITFAGCLTQIFFFVAFGCLD  
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 TNMEIPHFFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR  
 VSPAQQQHKAFASTCGSHLSVVTLFYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ  
 ID NO:110).  
 25 BASE COUNT 129 a 183 c 137 g 200 t  
 ORIGIN  
 1 ctttctgac atctgttca catccacgac cgtcccaaag atgctggtgg gtatccaaac  
 61 acaaagcaaa atgacactt ttgcagggtg cctcaccag attttttt tcgttcatt  
 121 tggatgcctg gacaattgc tctgaccgt gatggcctat gaccggtcg tggccatctg  
 30 181 tcacccctg cactacgagg tcatcatgaa ccccggtc tgtagactgc tagttctggg  
 241 gtcctggtgc atcagtgtca tggtttctc gtcgagacc ttgaccattt tgaggctgc  
 301 cttctgcaca aacatggaaa tccacactt ttttgtgat gttctcgaag tcctgaagct  
 361 cgcctgttct gaaaccctcg tcaataaaat cgtgatgtat ttttgacaa ttgcaatggg  
 421 tgttttctct ctctctggaa tcctatactc ttattctcag attttctct ccatcctgag  
 35 481 agtatcacct gcccaaggcc agcacaagc ctttccacc tgtgggtc acctctcagt  
 541 ggtcacctg ttctatggca cgggccttgg ggtatatctc agttctgcag ctacaccatc  
 601 ttctaggaca agtctgatgg cctcgggtgat gtacaccatg gtacccccc (SEQ ID NO:109).  
  
 40 **OR72**  
 LOCUS AF127885 658 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY10 pseudogene, partial sequence.  
 ACCESSION AF127885  
 KEYWORDS .  
 45 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 658)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 658)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5 source 1..658  
 /organism="Pongo pygmaeus"  
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 /gene="PPY10"  
 10 /pseudo  
 BASE COUNT 131 a 176 c 135 g 216 t  
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 61 tcacagcaga gtcatttctt aggcaggcta cctgactcag atgtctctct ttgccatttt  
 15 121 tggaggcgtg gaagagagac atgctcctga gtgtgaaggc ctatgaccgg ttgtagcca  
 181 cctgtcaccg tctgtatcat tcagccatca tgaagtcattg ttctgtggc ttctagttt  
 241 tgtgtcttt ttttttctc tcagtctttt agacgccccaa ctgcacaact tgattgcctt  
 301 gcaaatggcc tgctttgagg atgtggaaat ttctaatttc ttctgtgacc cttctcaact  
 361 ccccatcttg catgttgtga cagcttcacc gataacatca tcacgtatct cctcgacgcc  
 20 421 atatccctct ttatcccat ctcggggacc cttttctcta taatatcaaa ttgttctc  
 481 cattctgagg gcttcacat caggtgggag gtataaagcc ttctccatct gtgggtctca  
 541 cctgtcagtt gtttgcttat ttatggaac aggcataatgg gggtacctca gttcagatgt  
 601 gtcactctcc ctgagaaagg ctgcagtgac ctcagtgatg tacaccgtgg tcaccccc (SEQ ID NO:111).  
 25 **OR73**  
 LOCUS AF127886 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus olfactory receptor (PPY11) gene, partial cds.  
 ACCESSION AF127886  
 30 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 35 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 40 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 45 FEATURES Location/Qualifiers  
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 CDS <1..>649  
 /gene="PPY11"  
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 /product="olfactory receptor"  
 55 /translation="LADIGFTSTTVPKMIVDMQTHSRVISYAGCLTQMSFFVLACMD

DMLLSVMA YDRFVAICHPPDYPVTMNPFCGFLVLLSFFLSLLDSQLHNWIALQITCF  
 KDVEIPNFFCDPSQLPHLACCDTFTNDIVMYFLAAIFGFLPILGILFSYYKIVSSILR  
 VSSSGGRYKAFATCGSHLSVVCLFYGTALGGYLSSDMSSYPKGAVASVMTVVTP" (SEQ

ID NO:113).

5 BASE COUNT 125 a 174 c 130 g 220 t

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1 cttggctgac atcggtttca cctccaccac ggtccccaag atgattgtgg acatgcaaac  
 61 tcacagcaga gtcattcctc atgcaggctg cctgactcag atgtctttt ttgtcctttt  
 121 tgcattgatg gatgacatgc ttctgagtgt gatggcctat gaccggttg tggccatctg  
 10 181 tcacctccg gattaccag ttacatgaa cccatgttc tgtggcttc tagttttgt  
 241 gtctttttt ctcagtctt tagactccca gctgcacaat tggattgcct tacaaattac  
 301 ctgcttcaag gatgtggaaa ttcccaattt ctctgtgac ccttcccaac tccccacct  
 361 tgcctgtgt gacacctca ccaatgacat agtcatttat ttcttctg ccatatttgg  
 421 ttttttccc atctgggga tcttttctc ttactataaa attgttctc ccattctgag  
 15 481 ggtttcatca tcagtgagg ggtataaagc ctgcgccacc tgggtcttc acctgtcagt  
 541 tgtttgctta tttatggaa cagcccttg agggtagctc agttcagaca tgcctctta  
 601 tccagaaaag ggtgcagtgg ctcagtgtat gtacacagt gtcaccccc (SEQ ID NO:112).

## OR74

20

LOCUS AF127887 654 bp DNA PRI 28-FEB-2000

DEFINITION Pongo pygmaeus PPY12 pseudogene, partial sequence.

ACCESSION AF127887

KEYWORDS .

25

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 654)

30

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 654)

35

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

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source 1..654

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>654

/gene="PPY12"

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/pseudo

BASE COUNT 124 a 178 c 135 g 217 t

ORIGIN

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 50 121 ggcacggaag agagacatgc tctgagtgt gatggcctat gaccggttg tagccatctg  
 181 tcacctcta tatcattcag tcatcatgag cccgtgttc tgtggcttc tagttttgt  
 241 gtctttttt ttcttctcag tcttttagac tccagctgc accactgtat tgccttgcta  
 301 atgacctact tcaaggatgt ggaaattccg aatttctct gtatccttc tcaactccc  
 361 catattgcat gttgtgatgc cttaccaat aacatcatca tgtatttccc tgcacaatg  
 55 421 ttgtctttc ttcccatctc ggggactctt ttcttact ctaatttgt ctctccatt

481 ctgagggttt cgtcatcagg tgggaaatat aaagccctct ccacctgtgg gtctcactgg  
 541 tcagttgttt gctgagcttc tggaacaggc gttggagggt acctcagttc agatgtgtca  
 601 tcttccccca gaaagggtgc agtggcctca gtgatgtgca ccgtggtcac cgcc (SEQ ID NO:114).

## 5 OR75

LOCUS AF127888 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus olfactory receptor (PPY49) gene, partial cds.  
 ACCESSION AF127888  
 10 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 15 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 20 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 25 FEATURES Location/Qualifiers  
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 /organism="Pongo pygmaeus"  
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 gene <1..>649  
 30 /gene="PPY49"  
 CDS <1..>649  
 /gene="PPY49"  
 /codon\_start=2  
 /product="olfactory receptor"  
 35 /translation="FVDTCFISTTVPKMLVNIQARSKEISYMGCLTQVYFLMMFAGMD  
 TFLAVMAYDRFVAICHPLQYAVIMNPHLCGLLVLASWFIIFWVSLVHILLMKRLTFS  
 TGTEIPHFFCELAQVLKVARSDTLNINIVLYVATALLGVFPVAGILFSYSQIVSSLMR  
 MSSTEGKYKAFSTCGSHLCVVSFLNGTGLGVYLSSAVTHSSQSSSMASVMYAMVTP" (SEQ  
 ID NO:116).  
 40 BASE COUNT 119 a 187 c 146 g 197 t  
 ORIGIN  
 1 ctttgtggac acctgtttca tctccaccac agtccccaag atgctagtga acatccaggc  
 61 acggagcaaa gaaatctcct acatggggtg cctcactcag gtgtatttt taatgatgtt  
 121 tgctggaatg gatactttcc tactggctgt gatggcttat gaccggtttg tggccatctg  
 45 181 ccacccctt cagtacgagg tcatcatgaa ccccatctc tgtggcctgc tggttctggc  
 241 atcttggttc atcattttct gggctccct ggttcatatt ctactgatga agaggctgac  
 301 ctttccaca ggcaactgaga ttccgcattt cttctgtgaa ctggctcagg tcctcaaggt  
 361 ggcccgctct gataccctcc tcaataacat tgtctgtat gtggccacgg cactgctggg  
 421 tgtgttctct gtactggga tcctctctc ctactctcag atcgtctcct ccttaatgag  
 50 481 aatgtctcc accgaggga agtacaagc ctttccacc tgtggatctc acctctgtgt  
 541 ggtctccttg ttaaatggaa caggacttgg ggtctatctc agttctgtg tgacccattc  
 601 ttccagagc agtccatgg cctcagtgtat gtatgccatg gtcaccccc (SEQ ID NO:115).

## 55 OR76

LOCUS AF127889 660 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY50 pseudogene, partial sequence.  
 ACCESSION AF127889  
 KEYWORDS .  
 5 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 660)  
 10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /db\_xref="taxon:9600"  
 gene <1..>660  
 /gene="PPY50"  
 25 /pseudo  
 BASE COUNT 122 a 181 c 146 g 211 t  
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 1 ctgcctgac atcagttca cctccaccac ggtccccaag atgattgtgg acatccaatc  
 61 tcacagcaga gtcactcct atgcaggctg cctgactcag atgtgtctcc tggccatttt  
 30 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagcccc  
 181 tctgtcacc tctatatcgt tcagccatct tgaacccgtg ttctgtggc ttcctagatt  
 241 tgtggtcttt gttttcttt tctcagttct ttagactcc cagctgcga acttgattgc  
 301 cttagcatg acctgctca aggatgtgga aattcctaatt tcttctggg aacctcttca  
 361 actccccat ctacatttt gtgacacctt caccagtaac atccacatgt attccctgc  
 35 421 tgccgtattt ggtttcttc ccatctcggg ggcccttttc tcttacgta aaattgttc  
 481 ctccattctg agggtttcat catcagggtg gaagtatcaa ccttctccac ctgtgggtct  
 541 cacctgtcag ttgttgctg attttacgga acaggcggtg gagggtagct gggttcagat  
 601 gtgtatccc ccccgagaaa ggggtcagtg gcctcagtg gtacacggt ggtcaccccc (SEQ ID NO:117).

#### 40 OR77

LOCUS AF127890 648 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY51 pseudogene, partial sequence.  
 ACCESSION AF127890  
 45 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 50 REFERENCE 1 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 55 REFERENCE 2 (bases 1 to 648)



AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 5 FEATURES Location/Qualifiers  
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         /pseudo  
 BASE COUNT 128 a 183 c 134 g 203 t  
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 15     1 cttgtgtgac atctgttttg tgtctagcac tctaccaaag atgctgggga atatccagac  
    61 acacagcaaa gtcacacct atgcaggctg catcaccag gtgtgctttt tegtattctt  
   121 tgcaggattg gacatcttc tctgactgt gatggcctat gacggttgt ggccatctgt  
   181 caccctctgc actacacgt catcatgagc cccaggctct gtggactgct ggttctggca  
   241 tcttgatca tgagtgcct gaattcctg ctacaaagct taatagtact gcggctttcc  
   301 ttctgcacag atttgaaat cccccacttt ttctgtgaac taatcagggt caccacactt  
 20   361 gctgtttct acacctttct taacgacatg gtgatgtatt tgcacatgc gttgtggggc  
   421 ggtgtccccc tactgggat ctttactct tactctaaga ttgttctc catacgtgca  
   481 atctcatcag ctcaggggaa gtacaaggca tttccacct atgcgtctca cctctcagt  
   541 gtctccttat ttatgtgtac actcctaggg gtgtacctta gttctgctgc aaccacaac  
   601 tcatactcaa gtgtgcagc ctcggtgatg tacactgtgg tcaccccc (SEQ ID NO:118).  
 25

## OR78

LOCUS AF127891 660 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY52 pseudogene, partial sequence.  
 30 ACCESSION AF127891  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 35     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 40 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 45     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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         /gene="PPY52"  
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 BASE COUNT 122 a 181 c 146 g 211 t  
 ORIGIN  
 55     1 cttgcctgac atcagtttca cctccaccac gggtcccaag atgattgtgg acatccaatc

61 tcacagcaga gtcctcct atgcaggctg cctgactcag atgtgtctcc tggccattt  
 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagccc  
 181 tctgtcacc tctatacgt tcagccatct tgaacccgtg ttctgtggc ttcctagatt  
 241 tgtggcttt gttttctt tcctcagctt ttagactcc cagctgcga acttgattgc  
 5 301 cttagcatg acctgctca aggatgtgga aattcctaatt ttcttctggg aacctctca  
 361 actccccat ctacatttt gtgacacct caccagtaac atccacatgt attccctgc  
 421 tgccgtattt ggtttctt ccatctcggg ggccctttt tcttacgta aaattgttc  
 481 ctccattctg agggttcat catcagggtg gaagtacaa ccttccac ctgtgggtct  
 541 cacctgtcag ttgttgctg attttacgga acaggcgtg gagggtagct gggttcagat  
 10 601 gtgtatccc ccccgagaaa ggtgtcagtg gcctcagtg tgtacacggt ggtcaccccc (SEQ ID NO:119).

## OR79

LOCUS AF127892 633 bp DNA PRI 28-FEB-2000  
 15 DEFINITION Pongo pygmaeus PPY76 pseudogene, partial sequence.  
 ACCESSION AF127892  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 633)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 25 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 633)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 30 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
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 /gene="PPY76"  
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 BASE COUNT 134 a 155 c 124 g 220 t  
 40 ORIGIN  
 1 cttgcctgac attggttca ccttgccac ggtcccaag atgatttag acatgcaatc  
 61 acatagcaaa gtcctctccc atgcgggctg tctgacacag atatcttct ttgtccttt  
 121 tgcattgata gatgacatgc tctgactgt gatggcctat gactgattcg tggccatctg  
 181 tcacccctg aactaccag tcattcatgaa tctcacctc tgtgtctct tagtgttgg  
 45 241 gtcttttcc ttgacctgt ggattccag ctgcacaatt ggattgtac aattcacctg  
 301 ctcaagaat gtggaatct ttaatttgt ctgtgactga tctaacctt gcctgttctg  
 361 actgtgtcat cagtaacata ttacacatt tagatagtag aatacttggg ttcttccca  
 421 ttccaggat cctttgtct tactataaaa ttgtgccctc catttaaga attccattgt  
 481 cagatgggaa gtataaagcc ttctccacct gtggctctca cctggcaatt gttgcttat  
 50 541 ttatggaac aggcatttgt gtgtacatga cttcagctgt gtactatcc cccaggaatg  
 601 gtgtgtcag tgtgtatgt tgtggccacc ccc (SEQ ID NO:120).

## OR80

LOCUS AF127893 648 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus PPY77 pseudogene, partial sequence.  
5 ACCESSION AF127893  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
20 Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/organism="Pongo pygmaeus"  
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25 gene <1..>648  
/gene="PPY77"  
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BASE COUNT 140 a 172 c 129 g 207 t  
ORIGIN  
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121 tggatgcctg gacaatttac tctgaccgt gatggcctat gaccgctca tggccatctg  
181 tcacccctg cactacacac ggatcatcatg aaccaccagc tctgtggact gctgggtcta  
241 gggctctagt gcatcagtgt catgggtccc tgctcaagac ctgactgtt ttgaggctgt  
35 301 cctctgcaca aaatggaaat tccacacttt tttgtgatc ttctggaagt cctgaagctc  
361 gcctgttctg acaccttcat caataacgta gtgatatact ttgcaactgg catcctgggt  
421 gtgattccct tcactggaat acttttctct tactataaaa ttgtttctc tatactgagg  
481 atttcctcag ctgggagaaa gtgcaaagcg tttccacct gtggttccca cctctcagtg  
541 gtcagcttgt tctatggcac aggttttggg gtctatctca gttctgcagc tacaccatct  
40 601 tctaggacaa gtctggtggc ctcagtgatg tacaccatgg ttaccccc (SEQ ID NO:121).

## OR81

LOCUS AF127894 660 bp DNA PRI 28-FEB-2000  
45 DEFINITION Pongo pygmaeus PPY78 pseudogene, partial sequence.  
ACCESSION AF127894  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 660)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
55 reduction of function in primates

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /db\_xref="taxon:9600"  
 gene <1..>660  
 /gene="PPY78"  
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 BASE COUNT 118 a 185 c 140 g 217 t  
 15 ORIGIN  
 1 cttgcctgac atcggtttca cctccaccac ggtccccaag atgattgtgg acatccaatc  
 61 tcacagcaga gtcattcct atgcaggctg cctgactcag atgtgtctcc tggccatttt  
 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagccc  
 181 tctgtacccc tctatcgt tcagccatct tgaacccgtg ttctgtggc ttcttagatt  
 20 241 tgtggtcttt gttttcttt tctcagttct tttagactcc cagctgcaca acttgattgc  
 301 cttagcctg acctgcttca aggatgtgga aattcctaatt ttctctggg aaccttctca  
 361 actcccccct ctacatttt gtgacacctt caccagtaac atccacatgt attccctgc  
 421 tgccgtattt ggtttcttc ccatctcggg ggcccttttc tctactgta aaactgttc  
 481 ctccattctg aggggtttcat catcagggtgg ggagtatcaa ccttctccac ctgtgggtct  
 25 541 cacctgtcag ttgtttgctt attttatgga acagccctg gagggtaacct cagttcagct  
 601 gtgtcccttt cctccaggaa ggggtcagtg gcctcagtgatgtgtacctgttgggtcaccctt (SEQ ID NO:122).

## OR82

30 LOCUS AF127895 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY85 pseudogene, partial sequence.  
 ACCESSION AF127895  
 KEYWORDS .  
 SOURCE orangutan.  
 35 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 50 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 gene <1..>649  
 /gene="PPY85"  
 /pseudo  
 55 BASE COUNT 118 a 174 c 131 g 226 t

# ORIGIN

1 cttggctgac atcagttttg cctctaccac ggcccccaag atgattgtgg acatccaggc  
61 tcacagcaga ctcatctctt atgtgggctg cctgactcag atgtctttt tgalcctttt  
121 cgcattgatg gaaagtctgc tctgactgt gatggcctat gaccggtttg aggccatctg  
181 tcacccccctg cactcccaag tcacacgag cccacgactc tgtggcctct tagtttgggt  
241 gtcctttttt cttagccttt tggactctca gctgcacaat ttgattgtgt tacaacttac  
301 ctgcttcaat gatgtggaaa tctctaattt ttctctgtga ccttctcaa ctctcagcc  
361 tggcctgttc tgacacctcc attaataaca tggctgtata tttattgggt gccatatttg  
421 gttttctccc tctcttaggg atccttttct ctactataa aattatttct tccattctgc  
481 gatttcgctc ttcaggtggg aagtataaag ccttctccac ctgcagctct cacctgtcag  
541 ttgtttgctt attttatgga acagcccttg gagggtagct cagttcagct gtgtcccttt  
601 cctccaggaa gggtgcagtg gcctcagta gtacctggt ggtcacccc (SEQ ID NO:123).

# OR83

15 LOCUS AF127896 649 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY9) gene, partial cds.  
ACCESSION AF127896  
KEYWORDS .  
20 SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 649)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
35 source 1..649  
/organism="Pongo pygmaeus"  
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gene <1..>649  
/gene="PPY9"  
40 CDS <1..>649  
/gene="PPY9"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFASTTVPKMLVNIQAQSKVITYAGCITQMYFFTHFVGLD  
45 SFLTVMAYDRFVAICHPLHYTVIMNPQLCGLLVLASWIMSVLHSLQSLMVLRLSLC  
RELEIPHFFCELNQVIHLACSDTFLDDMVMYLA AVLGGGCLAGILYSYSKIVSSICA  
ISSAQGKYKAFSTCASHLSVVSFLFYCTSLGVYLSSAAIHNSHSSAIVMYTVVTP" (SEQ ID  
NO:125).  
BASE COUNT 136 a 173 c 140 g 200 t  
50 ORIGIN  
1 cttttagac atctgttttg cctctaccac ggccccaaag atgctggtga atatccaggc  
61 acagagcaaa gttatcacct atgcaggctg catcacccag atgtactttt tcacacattt  
121 ttttaggttg gacagcttcc tcttaactgt gatggcctat gaccggtttg tggccatctg  
181 tcacccccctg cactacacgg tcacatgaa cctcaactc tgtggattgc tggctctggc  
241 gtcctggatc atgagtgtct tgcatcctt attacaaagc ttaatggtgc tgcggttgct

301 cttatgcaga gagttggaaa tccccactt ttctgcgaa cttatcagg tcatccacct  
 361 tgctgttct gacaccttc ttgatgacat ggtgatgat ttggcagctg tgctgctggg  
 421 tgggggatgt ctgctggga tccttactc ctactctaag atagtttct ccatatgtgc  
 481 aatctcatca gctcaaggga agtataaggc atttccacc tgtgcattc acctctcagt  
 5 541 tgtctcctg tttattgta cgagcctagg agtgtacct agctcgctg caatccacaa  
 601 ctcacactca agtgaatag cctcagtgat gtacaccgtg gtcaccccc (SEQ ID NO:124).

## OR84

10 LOCUS AF127897 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO27) gene, partial cds.  
 ACCESSION AF127897  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 15 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 30 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>649  
 /gene="SBO27"  
 CDS <1..>649  
 35 /gene="SBO27"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LVDFCLATDTIPKMLVSLQTRSKAISYPCCLTQMYFFHFFGIVD  
 SVLIAVMAYDRFVAICHPLHYATIMSPRLCGLLVGAPWVFSCFISLTHILLMARLVFC  
 40 GSKVPHYLCDLTPILRLSCTDTSVNRIFLT VAGMVIATPFICILASYACILVAIMK  
 IPSAGGRKKAFSTCSSHLSVVALFYGTTIGVYLCPSVHTAVKEKASAVMYTVVTP" (SEQ ID  
 NO:127).  
 BASE COUNT 112 a 218 c 145 g 174 t  
 ORIGIN  
 45 1 cctggtgat ttctgtctgg ccaccgacac catcccaag atgctggtga gcctcaaac  
 61 caggagcaag gccatctct atccctgctg cctgaccag atgtactct tccatttct  
 121 tggcatcgtg gacagcgtct taattgctgt aatggcgtat gaccgcttg tggccatctg  
 181 ccacccttg cactacgcca cgatcatgag cccacgcctc tgtggcctgc tggcggggc  
 241 cccctgggtg tttcatgct tcattctact caccacatc ctctgatgg cccgcctcgt  
 50 301 ttctgcggc agcctcaagg tgccctatta cttgtgcgac ctactccca tctccgact  
 361 ttctgcaca gacagctctg tgaacaggat ttcatcctc acttggtgag ggtggtgat  
 421 agccacgccc ttcatctgca tcttggcctc ctatgcttg atcctttag ccatcatgaa  
 481 gatccctct gcaggtggca ggaagaaagc ctttccacc tgcagctccc acctgtccgt  
 541 ggtgtctct tttatggga ccaccattgg ggtctacct tgcctcctc cgttccacac  
 55 601 cgctgtaaag gagaaagctt ctgctgtgat gtacacagta gtcaccccc (SEQ ID NO:126).

## OR85

LOCUS AF127898 646 bp DNA PRI 28-FEB-2000  
5 DEFINITION Saimiri boliviensis olfactory receptor (SBO28) gene, partial cds.  
ACCESSION AF127898  
KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 646)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
15 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 646)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..646  
/organism="Saimiri boliviensis"  
25 /db\_xref="taxon:27679"  
gene <1..>646  
/gene="SBO28"  
CDS <1..>646  
/gene="SBO28"  
30 /codon\_start=2  
/product="olfactory receptor"  
/translation="LADIGFTSTTVPRATIVNIQTHSRVIAYASCLTQMSFSIFFACME  
DTLLAVMAYDRFVAICHPLHYPVIMNPRLCGFLVLVSVFLSLLISQVHNLIVLQFSCF  
KEIKISNFFCDPSQLLTLSCSDTFVNIVTNFFAAVFGFLPISGIFFSYKYIAPSILR  
35 VPLSSGKYKAFSTCSSHLAVVCLFYGTVIGVYLGSSMASPRKSVVASVMTVVTP" (SEQ ID  
NO:129).  
BASE COUNT 137 a 167 c 122 g 220 t  
ORIGIN  
1 cttggctgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac  
40 61 tcacagcaga gtcacgcct atcgagctg cctgacacag atgtctttt caatatattt  
121 tgcgtgtatg gaagacacgc tctggctgt gatggcctat gaccggttg ttgccatctg  
181 tcacccctg cactaccag tcacatgaa cccacgactc tgggcttct tagtgttgg  
241 gtctgtttt cttagcctt taatatcca ggtgcacaat ttgattgtc tacaatttc  
301 ttgctcaaa gagataaaga tttctaatt cttctgtgac cttctcaac tctcaccct  
45 361 tcttgttct gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtatttg  
421 tttcttccc atctcaggga tcttttctc ttactataaa attgccccct ccattctgag  
481 agttcatta tcaagtggga agtataaagc cttctccacc ttagctctc acctggcagt  
541 tgttgttta tttatggaa cagtcattgg agtgtacct gggcatcaa tggcatcccc  
601 caggaagagt gtggggcct cagtgatga cacagtgctc actccc (SEQ ID NO:128).

50

## OR86

LOCUS AF127899 649 bp DNA PRI 28-FEB-2000  
55 DEFINITION Saimiri boliviensis olfactory receptor (SBO29) gene, partial cds.  
ACCESSION AF127899

KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
15 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..649  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"  
20 gene <1..>649  
/gene="SBO29"  
CDS <1..>649  
/gene="SBO29"  
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25 /product="olfactory receptor"  
/translation="FVDICFVSTTPVKMLVNIQTHSKVITFAGCITQIGHCLLFAALD  
IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
TDLEIPRFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSGAAALVMYTVVTP" (SEQ ID  
30 NO:131).

BASE COUNT 138 a 177 c 133 g 201 t  
ORIGIN  
1 cttttagac atctgtttt gtgtctaccac tgtcccgaag atgctggtaa atatccagac  
61 acacagcaaa gtcacacct ttgcaggctg catcaccag ataggccatt gcctactctt  
35 121 tgcagcattg gacatcttta gtgtgactgt gatggcctat gaccggatg tggccatctg  
181 tcacccctg cactacacag tcaccataa cccagactg tgtggactgc tggttctggc  
241 atctggatc ctgagtgcct tgaattcctc attacaaacc ttaatagtgc tgcggcttgc  
301 ttctgcaca gacttggaaa tccccgcctt ttctgcgaa cttaatcagg tcatacatc  
361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgcgtctggg  
40 421 cggtggtccc ctcacaggaa ttatttactc ttactctaag atagtttctc ccatacgtgc  
481 aatctcatca gtcaggggga agtacaaggc gttttccacc tgtgcattc acatcttaat  
541 tgtctccta tttatggta cactctagg tgtgtacct agttctgctg caactggcaa  
601 ctcacattca ggtgctgcag ccttggtgat gtacactgtg gtcaccccc (SEQ ID NO:130).

45 **OR87**

LOCUS AF127900 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO30) gene, partial cds.  
ACCESSION AF127900  
50 KEYWORDS .

SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
55 REFERENCE 1 (bases 1 to 649)



AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
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 /organism="Saimiri boliviensis"  
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 15 /gene="SBO30"  
 CDS <1..>649  
 /gene="SBO30"  
 /codon\_start=2  
 /product="olfactory receptor"  
 20 /translation="FVDICFVSTTPKMLVNIQTHSKVITFADCITQIGHCLLFAALD  
 IFMLTVMAYDRYVATCHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC  
 TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
 ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSSHSSAAALVMYTVVTP" (SEQ ID  
 NO:133).  
 25 BASE COUNT 141 a 179 c 130 g 199 t  
 ORIGIN  
 1 cttttagac atctgtttg tgtctaccac tgcctcgaag atgctggtaa atatccagac  
 61 acacagcaaa gtcacacct ttgcagactg catcaccag ataggccatt gcctactctt  
 121 tgcagcattg gacatcttta tgctgactgt gatggcctat gaccggtatg tggccacctg  
 30 181 tcacccctg cactacacag tcaccattaa cccagactg tgtggactgc tggttctggc  
 241 atcctggatc ctgagtgccc tgaattcctc attacaacct ttaatagtgc tgcggctttc  
 301 ctctgcaca gacttggaaa tccccactt ttctgcgaa cttaatcagg tcatacatct  
 361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgctgctggg  
 421 cgggtgtccc ctcacaggaa ttattactc ttactctaag atagtttct ccatcgtgc  
 35 481 aatctcatca gctcagggga agtacaaggc gtttccacc tgtgcatctc acatcttaat  
 541 tgtctcttta tttatgta cactcctagg tgtgtacctt agttctgctg caactggcaa  
 601 ctcacatca agtgcgcag ccttggatgt gtacacagt gtcaccccc (SEQ ID NO:132).  
  
**OR88**  
 40 LOCUS AF127901 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC31) gene, partial cds.  
 ACCESSION AF127901  
 KEYWORDS .  
 45 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5 source 1..649  
 /organism="Saimiri sciureus"  
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 10 CDS <1..>649  
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 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD  
 15 IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
 TDLEIPHFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
 ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSSHSSAAALVMHTVVTP" (SEQ ID  
 NO:135).  
 BASE COUNT 141 a 178 c 131 g 199 t  
 20 ORIGIN  
 1 cttgtagac atctgttttg tgtctaccac tgcctcgaag atgctggtaa atatccagac  
 61 acacagcaaa gtcacacact tgcaggctg catcaccag ataggccatt gcctactctt  
 121 tgcagcattg gacacttta tgcgtactgt gatggcctat gaccggatg tggccatctg  
 181 tcaccccttg cactacacag tcaccattaa cccagactg tgtggactgc tggctctggc  
 25 241 atcctggatc ctgagtccc tgaattcctc attacaacc ttaatagtgc tgcggcttcc  
 301 ctctgcaca gacttgaaa tccccactt ttctgcgaa cttaatcagg tcatacatct  
 361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgctgctggg  
 421 cgttggtccc ctcacaggaa ttattactc ttactctaag atagtttct ccatcgtgc  
 481 aatctcatca gctcagggga agtacaaggc gtttccacc tgtgcatctc acatcttaat  
 30 541 tgtctctta tttatggta cactcctagg tgtgtacct agttctgctg caactggcaa  
 601 ctcacatca agtgctgcag ccttggtgat gcacacagtg gtcaccccc (SEQ ID NO:134).

## OR89

35 LOCUS AF127902 646 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC32) gene, partial cds.  
 ACCESSION AF127902  
 KEYWORDS  
 SOURCE common squirrel monkey.  
 40 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..646  
 55 /organism="Saimiri sciureus"

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 CDS <1..>646  
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 /product="olfactory receptor"  
 /translation="LADIGFTSTTVPRATIVNIQTHSRVIAYASCLTQVSFSIFFACME  
 DTLLAVMAYDRFVAICHPLHYPVIMNPRLCGFLVLVSVFLSLLISQVHNLIVLQFSCF  
 KEIKISNFFCDPSQLLTLSCSDTFVNNIVTNFFAAVFGFLPISGIFFSYKYIASSILR  
 VPLSSGKYKAFSTCSSHLAVVCLFYGTIVIGVYLGSSMASPRKSVVASVMYTVVTP" (SEQ ID

NO:137).

BASE COUNT 135 a 166 c 123 g 222 t

ORIGIN

15 1 ctggcgtgac attggttcca cctccaccac agtccccagg acaattgtga acattcaaac  
 61 tcacagcaga gtcacgcct atgcgagctg cctgacacag gtgtctttt caatctttt  
 121 tgcgtgtatg gaagacacgc tcctggctgt gatggcctat gaccggttg ttgccatctg  
 181 tcacccctg cactaccag tcacatgaa cccacgactc tgtgctct tagtgttggt  
 241 gtctgtttt cttagcctt taatatccca ggtgcacaat ttgattgtc tacaatttc  
 20 301 ttgctcaaa gagataaaga ttctaattt ctctgtgac ccttcaac tctcaccct  
 361 ttctgttct gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtattgg  
 421 tttctccc atctcagga tctttctc ttactataaa attgctcct ccattctgag  
 481 agttcatta tcaagtggga agtataaagc cttctccac ttagctctc acctggcagt  
 541 tgtttgctta tttatggaa cagttattgg agtgtacctt gggtcatcaa tggcatcccc  
 25 601 caggaagagt gtggggcct cagtgtgta cacagtggc actccc (SEQ ID NO:136).

## OR90

LOCUS AF127903 649 bp DNA PRI 28-FEB-2000  
 30 DEFINITION Saimiri sciureus olfactory receptor (SSC33) gene, partial cds.  
 ACCESSION AF127903  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 35 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 40 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 45 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Saimiri sciureus"  
 50 /db\_xref="taxon:9521"  
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 /gene="SSC33"  
 CDS <1..>649  
 /gene="SSC33"  
 55 /codon\_start=2

/product="olfactory receptor"  
 /translation="FSDLCFSSVTIPKLLQNMQSQDPSIPYAGCLTQMYFFLYFSDLE  
 SFLLVAMAYDRYVAICLPLHYATIMSPMLSRSLVALSWVLTFHAMLHTLLMARLRF  
 ADNVILHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPLLLIIGSYARIVFSILK  
 VPSSKGICKAVSTCGSHLSVVSIFYGTVIGLYLCPSSANNSTLKETVMAVMYTVMAP" (SEQ  
 ID NO:139).  
 BASE COUNT 115 a 192 c 134 g 208 t  
 ORIGIN  
 1 cttctgtgac ctctgcttct cttctgtgac cattccaaag ttgttacaga acatgcagag  
 61 ccaagaccaca tccatcccct atgcgggctg cctgaccag atgtacttct tctgtattt  
 121 ttggatcta gagagcttcc tcctgtggc catggcctat gaccgctacg tggccatctg  
 181 cctccccta cattagcca ccatcatgag ccccatgctg tctgctccc tgggtgctg  
 241 gtctgggtg ctgaccacct tccatgcat gttgcacct ttactcatgg ccaggttgcg  
 301 ttttgtgca gacaatgtga tcttccactt tttctgtgat atgtctgctc tctgaagct  
 361 ggcctgctct gacactcgag ttaatgaatt ggtgatattt atcatgggag gcctcattct  
 421 tgtcatcca cttctactta tcattgggtc ctacgcacga atgtcttct ccatcctcaa  
 481 ggtcccttct tctaagggtg tctgcaaggc cgtctctact tgtggctccc acctctctgt  
 541 ggtgtcactg ttctatggga ctgtattgg tctctactta tgcccatcag ctaataattc  
 601 tactctaaag gagactgtca tggctgtgat gtacactgtg atggccccc (SEQ ID NO:138).  
**OR91**  
 LOCUS AF127904 646 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC34) gene, partial cds.  
 ACCESSION AF127904  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..646  
 /organism="Saimiri sciureus"  
 /db\_xref="taxon:9521"  
 gene <1..>646  
 /gene="SSC34"  
 CDS <1..>646  
 /gene="SSC34"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LADIGFTSTTVPRITVNIQTHSRVIA YASCLTQMSFSIFFACME  
 DTLAVMA YDRFVAICHPLHYPVIMNPRLCGLVLVSVFLSLLISQVHNLIVLQFSCF  
 KEIKISNFFCDPSQLLTLSCSDTFVNNIVTNFFAAVFGFLPISGIFFSYKYIASSILR  
 VPLSSGKYKAFSTCSSHLAVVCLFYGTVIGVYLGSSMASPRKSVVASVMTVVTP" (SEQ ID  
 NO:141).

BASE COUNT 136 a 167 c 122 g 221 t

ORIGIN

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1 cttggtgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac
5 61 tcacagcaga gtcacgcct atgcgagctg cctgacacag atgtctttt caatctttt
121 tgcgtgatg gaagacacgc tctggctgt gatggcctat gaccggttg ttgccatctg
181 tcacccctg cactaccag tcacatgaa cccacgactc tgtggtctt tagtgttgt
241 gtctgtttt cttagcctt taataccca ggtgcacaat ttgattgtc tacaatttc
301 ttgctcaaa gagataaaga ttctaattt ctctgtgac cttctcaac tctcaccct
361 ttctgttct gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtattgg
10 421 ttttctccc atctcaggga tcttttctc ttactataaa attgcctct ccattctgag
481 agttccatta tcaagtggga agtataaagc cttctccacc ttagctctc acctggcagt
541 tgttgctta tttatggaa cagtattgg agtgacctt gggtcatca tggcatcccc
601 caggaagagt gtggtggcct cagtatgta cacagtgtc actccc (SEQ ID NO:140).
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15 **OR92**

LOCUS AF127905 649 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri boliviensis SBO64 pseudogene, partial sequence.

ACCESSION AF127905

20 **KEYWORDS**

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

25 **REFERENCE 1** (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

30 **REFERENCE 2** (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

35 **FEATURES** Location/Qualifiers

source 1..649

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>649

40 /gene="SBO64"

/pseudo

BASE COUNT 145 a 157 c 129 g 218 t

ORIGIN

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1 cttgtcgat ttctgtatt ccaccaccgt tatacccaaa ctgctggaga acttggtgt
45 61 ggaagacaga agcatctct tcacaggatg cgtcatgcaa ttcttttg ccagcatatt
121 tgtgtgaca gaaatattca tgctggcagt gatggcctat gacagattg ttgtgtgtg
181 ttacctctg ctctacacag ttgcaatgtc ccagaggctt ttcttttg tagtggtac
241 atcatactt agggtagacag tctgttctt gacaattacc ttcttctcc tggaaattac
301 cttcagagga aataatatca ttaataactt tgtgtgtgag cctgctgcca ttgtgtgtg
50 361 gccatgctt gaccctaca tgagccagga aatcattttc atttctgcca cattcaatga
421 aacaagcagc ctgatgatca ttctcacctc ctaagatttc gttttatca atgtcatga
481 gatgcctcc actggggggc gcataaaagc atgcgcgacc tttctctccc agctgaccgc
541 cattatcatt ttccatggga ccatctctt tctctattg gttcctaact ccaaaagtc
55 601 atggctcatg gtcaagggtg gctctatctt ttacacagt gtcacccc (SEQ ID NO:142).
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## OR93

LOCUS AF127906 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO65) gene, partial cds.  
5 ACCESSION AF127906  
KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
20 Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"  
25 gene <1..>649  
/gene="SBO65"  
CDS <1..>649  
/gene="SBO65"  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="FVDICVTSTTIPKTLNSIQTHSKVITYAGCVTQLYFSVLFIGLD  
SLLLTVMAYDRFVAICHPLRYMVIMNPQLCGLLVLVSWIMSALHSLTESLMALSLLFC  
TDLKILHFFCELNQIIHIACSDTCLNNLVMYLSAVLLGGGPLAGILYSYSKIASSIRA  
ISSAKGKYKAFSTCASHLSVVSIFYCTGLGVYLSSAATHNSLSSTAASVMYTVVTP" (SEQ ID  
35 NO:144).  
BASE COUNT 141 a 180 c 130 g 198 t  
ORIGIN  
1 cttgtgagac atctgtgta cctccaccac gattccaaag acatatcaa acatccagac  
61 acacagcaaa gtcacacct atgcaggctg tgcacccag ttgtacttt ctgtactct  
40 121 tatagggttg gacagcttac tcctgaccgt gatggcctat gaccgatttg tggccatctg  
181 tcacccctcg cgctacatgg tcacatgaa ccctcagctc tgtggactgc tggctctggt  
241 gtcttgatc atgagtgccc tgcattcctt gacagaaagc ttaatggcat tatcactgct  
301 cttttgtaca gacttgaaaa tcctccactt ttctgtgaa cttaatcaga taatccacat  
361 tgctgttctt gacacgtgc ttaataacct ggtgatgtat ttgcagctg tgctgctggg  
45 421 cgggtgtcct ctcgctggga tcctgtactc ttactctaag atagcttctt ctatacgtgc  
481 aatctcatca gctaagggga agtacaaggc atttccacc tgtcatctc acctctcagt  
541 tgtctcttta ttatttga caggcctagg ggtgtacctg agttctgctg caaccacaa  
601 ctcacttca agtacagcag cctcgggtgat gtacactgtg gtcaccccc (SEQ ID NO:143).

## 50 OR94

LOCUS AF127907 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC69) gene, partial cds.  
ACCESSION AF127907  
55 KEYWORDS .

SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

5 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France

15 FEATURES Location/Qualifiers  
     source 1..649  
         /organism="Saimiri sciureus"  
         /db\_xref="taxon:9521"  
     gene <1..>649  
         /gene="SSC69"  
     CDS <1..>649  
         /gene="SSC69"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="FVDICFVSTTPVKMLVNIQTHSKVITFAGCITQIGHCLLFAALD  
         IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC  
         TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
         ISSAQGKYKAFSTCASHILIVSLFYGTLLGAYLSSAATGNSSHSSAAALVMYTVVTP" (SEQ ID  
         NO:146).

30 BASE COUNT 139 a 179 c 131 g 200 t  
 ORIGIN  
     1 ctttgtagac atctgttttg tgctaccac tgcctcgaag atgctggtaa atatccagac  
     61 acacagcaaa gtatcacct tgcaggctg catcaccag ataggccatt gcctactctt  
     121 tgcagcattg gacatcttta tgctgactgt gatggcctat gaccggatg tggccatctg  
     35 181 tcacccctg cactacacag tcaccattaa cccagactg tgggactgc tggttctggc  
     241 atcttgatc ctgagtgccc tgaattctc attacaacc ttaatagtgc tgcggcttgc  
     301 ctctgcaca gacttgga aa tccccactt ttctgcgaa ctaatcagg tcatacatc  
     361 tgctgttat gacatttcc ttaatgatgt ggtgatgtat tggcagcta tgctgctggg  
     421 cggtggtccc ctcacaggaa ttattactc ttacttaag atagtttct ccatacgtgc  
     40 481 aatctcatca gctcagggga agtacaaggc gtttccacc tgtgcatctc acatctaat  
     541 tgctcctta tttatgga cactcctagg tgcgtacct agttctgctg caactggcaa  
     601 ctcacatca agtgctgcag ccttggtgat gtacactgtg gtcaccccc (SEQ ID NO:145).

**OR95**

45 LOCUS AF179716 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA133) gene, partial cds.  
 ACCESSION AF179716  
 KEYWORDS .

50 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Papio.

55 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>487  
 15 /gene="PPA133"  
 CDS <1..>487  
 /gene="PPA133"  
 /codon\_start=2  
 /product="olfactory receptor"  
 20 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
 FCADNVIPHHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLILGSIYARIVSSI  
 LKVPSSKGICKAFSTCGSHLSVVSIFYGTIIGLYFCPSANSSTLKETVMAMMYTVVTP  
 ML" (SEQ ID NO:148).  
 BASE COUNT 82 a 141 c 107 g 157 t  
 25 ORIGIN  
 1 tgtggccatc tgetccccc tgcactacac cgcccatcatg agccccatgc tctgtctcgc  
 61 cctgggtggc ctgtcctggg tctgaccac ctccatgcc atgttacaca ctttactcat  
 121 ggccaggttg tttttttg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 181 tctgtgaag ctggcctgct ctgacactcg agtcaatgaa ttggtgatat ttatcatggg  
 241 agggctgatt ctgtcatcc cattcctact catccttggg tcctatgcac ggattgtctc  
 30 301 ctccatcctc aaggtccctt cgtctaaggg tatctgaag gcgttctcta cttgtggctc  
 361 ccacctctct gtggtgtcac tgttctatgg gaccattatt ggtcttact tctgcccatc  
 421 agctaatagt tctactctaa aggagactgt tatggctatg atgtacactg tgggtgacccc  
 481 catgctg (SEQ ID NO:147).  
 35  
**OR96**  
 LOCUS AF179717 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA134) gene, partial cds.  
 40 ACCESSION AF179717  
 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 55 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR



1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
5 gene <1..>486  
/gene="PPA134"  
CDS <1..>486  
/gene="PPA134"  
10 /codon\_start=2  
/product="olfactory receptor"  
/translation="VAICQPLHYSTLLSPWACMAMVGTSWLTGIITATTHAFLIFSLP  
FPSRPIIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI  
LAMASTQSRKVFSTCSSHLLVVSLLFGTASITYIRPQAGSSVTTDRVLSVFYTVITP  
15 ML" (SEQ ID NO:150).  
BASE COUNT 85 a 181 c 97 g 123 t  
ORIGIN  
1 tgttgccatc tgccagcctc tgcactactc taccctcttg agcccatggg cctgcatggc  
61 catgtgtggc acctcctggc tcacaggcat catcacggcc accacccatg ccttcctcat  
20 121 cttctctcta ccttttccca gcgcccgaat catcccacac ttctctgtg acatcctgcc  
181 agtactgagg ctggcaagtg ctgggaagca caggagcgag atctctgtga tgacagccac  
241 tgtagcttc attatgatcc ccttctctct gattgtcacc tcttacatcc gcatcctggg  
301 agccatccta gcgatggcct ccaccagag ccgcccgaag gtcttccca cctgctcctc  
361 ccatctgctc gtggtctctc tcttcttg aacagccagc atcacctaca tccggccgca  
25 421 ggcaggtccc tctgttacca cagaccgct cctcagtgtg ttctacacgg tcatcacacc  
481 catgct (SEQ ID NO:149).

OR97

30 LOCUS AF179718 487 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas PPA135 pseudogene, partial sequence.  
ACCESSION AF179718  
KEYWORDS .  
SOURCE baboon.  
35 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 487)  
40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
50 source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
/gene="PPA135"  
55 /pseudo

BASE COUNT 112 a 140 c 89 g 146 t

ORIGIN

1 tgtggacatc tgaagtcct tgcactacc agtcatcatg aacgaaagaa cacgggccaa  
5 61 actggctgct gcttcttggt tcccaggctt tctgtagct actgtgcaga ccacgtggct  
121 cttcagcttt ccattctgtg gcaccaacaa ggtgaaccac ttcttctgtg acagcccacc  
181 tgtgctgaag ctggtctgtg tagacacagc actgtttgag atctacacca tcactggaac  
241 cattctgggt gtcattgatcc cctgcttgct gatcttgggt tctacactc tcattgtgc  
301 tgccatccct aagatcccat cagctaaagg gaagcataaa gccttctcta cgtgatcctc  
361 acatctcctt gttgtctctc tttctatct atcataaac ctcacatatt ttcagcctaa  
10 421 atcaataat tctctgaaa gcaaaaagct gctatcattg ttctacactg ttgtgactcc  
481 catgttg (SEQ ID NO:151).

OR98

15 LOCUS AF179719 482 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas PPA136 pseudogene, partial sequence.  
ACCESSION AF179719  
KEYWORDS .

SOURCE baboon.

20 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 482)

25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 482)

30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35 source 1..482  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>482  
/gene="PPA136"  
40 /pseudo

BASE COUNT 91 a 151 c 96 g 144 t

ORIGIN

1 tgtggccatc tgccacccc tctactatgt cacagccatg agtctcggac tctgtatctt  
61 gctcctctgc ttgtgtggg ggtctctgt tctctatggt ctctcctca ctctcctct  
45 121 gaccaggggtg acctctgtg ggactcaaga gatccactac ctctctgtg agatgtacgt  
181 cctgctgcag ctggcatgtt ccaacacca catcattcac acagtctggg ttgtactgg  
241 ctgcttctt cctcgacccc ttagggttca cgactacatc ctatatacgt attgcagaa  
301 ccattcctca gataccctca gcctctaaga aacacaaaac ctctctgcc tgtgcctcac  
361 attgggtgt ggtctcctc tttatggga cacttggtat ggtatacctg cagcccctcc  
50 421 acacctactc catgaaggac tcagtagcca cagtgatgta tgctgtggtg acacctatga  
481 tg (SEQ ID NO:152).

OR99

55 LOCUS AF179720 481 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA137) gene, partial cds.  
 ACCESSION AF179720  
 KEYWORDS .  
 SOURCE baboon.  
 5 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Papio.  
 REFERENCE 1 (bases 1 to 481)  
 10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 481)  
 15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 20 source 1..481  
     /organism="Papio hamadryas"  
     /db\_xref="taxon:9557"  
     gene <1..>481  
     /gene="PPA137"  
 25 CDS <1..>481  
     /gene="PPA137"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="LAICQPLRYPVLMNGRLCTVLVAGAWVAGSIHGSIQATLTFRLP  
 30 YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDIGVVAASCFMLILLSYANIVHAI  
     LKIRTTDGRRRAFSTCGSHLTVVTVYYVPCIFIYLRAGSKSPLDGAVAVFYTVVTPFL" (SEQ  
     ID NO:154).  
 BASE COUNT 89 a 139 c 116 g 137 t  
 ORIGIN  
 35 1 cctggcaata tgtcaacccc tgcgctaccc agtgcctcatg aatgggaggt tatgcacagt  
     61 ccttgtggct ggagcttggg tcgccggctc cattcatggg tctatccagg ccaccctgac  
     121 ctccgccta ccctattgtg ggcccaatca ggtagattac tttatctgtg acatccctgc  
     181 agtattgaga ctggcctgtg ctgacacaac tgtcaatgag cttgtgacct ttgtggacat  
     241 cggagtagtg gccgccagtt gcttcatgtt aattctactt tcctatgcca acatagtcca  
 40 301 tgccatcctg aagatacgca ccactgatgg gagggcgccgg gccttctcta cctgtggctc  
     361 ccacctaact gtgtcacag tctactatgt tccctgtatt ttcctctacc ttagggctgg  
     421 ctccaagagc ccctggatg gggcagtggc tgtgttttac actgttgca ctccattcct  
     481 g (SEQ ID NO:153).  
 45 **OR100**  
 LOCUS AF179721 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA138) gene, partial cds.  
 ACCESSION AF179721  
 50 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 55 Papio.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 5 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 10 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Papio hamadryas"  
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 15 gene <1..>487  
 /gene="PPA138"  
 CDS <1..>487  
 /gene="PPA138"  
 /codon\_start=2  
 20 /product="olfactory receptor"  
 /translation="VAICKPLLYPVIMTNGLCIRLLVLSFVGGFLHALIHEGILFRLT  
 FCNSNIHHFYCDIIPLLTISCTDPSINFLMLFILSGSIQVFTILTVLVSYAFVLFTI  
 LKKKSVKGIRKAFSTCGAHLFSVCLYYGPLLFMYVGPASPQADDQDMVECVFYTVIIP  
 FL" (SEQ ID NO:156).  
 25 BASE COUNT 117 a 106 c 74 g 190 t  
 ORIGIN  
 1 tgtagccata tgcaaacctt tactttatcc agtgattatg accaatggac tgtgcatccg  
 61 gctattatgc ttgtcatttg tagtggtgctt ccttcattgcc ttaattcatg aaggcatttt  
 121 attcagatta acctctgtga attctaacaat aatacatcac ttttactgtg acattatccc  
 30 181 attgttaacg atttcctgta ctgacccttc tattaatttt ttaatgcttt ttattttgtc  
 241 tgggtcaata caggtattca ctattttgac tgttcttgc tcttatgcat ttgtcctctt  
 301 tacaatctta aaaaaaaagt cagtcaaagg cataaggaaa gcctttcca cctgtggagg  
 361 ccattctctc tctgtctgtt tatactatgg cccctcttc ttcattgatg tgggccctgc  
 421 atctccacaa gcagatgatc aagatatggt agagtgtgta tttactactg tcatattcc  
 35 481 ttctta (SEQ ID NO:155).

## OR101

LOCUS AF179722 487 bp DNA PRI 31-DEC-2000  
 40 DEFINITION Papio hamadryas olfactory receptor (PPA139) gene, partial cds.  
 ACCESSION AF179722  
 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"

gene <1..>487  
/gene="PPA139"

10 CDS <1..>487  
/gene="PPA139"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICNPLLYMVVVSRRRLCLLLVSLTYLYGFSTAIVVSPCIFSMS  
YCSSNIINHFCYCDIAPLLALSCSDTYLPEAIVFISAATNLVFSMITVLVSYFNIVLSI  
15 LRMHSSEGRKKAFASTCASHMMAVTVFYGTMLFMLPQQTNHSLDTDKMASVFYTLVIP  
ML" (SEQ ID NO:158).

BASE COUNT 110 a 111 c 85 g 181 t

ORIGIN

20 1 tgtggccatt tgtaaccctc tgctctacat ggtgggtgtg tctcggcggc tctgcctcct  
61 gctggtctcc ctcacatacc tctatggctt ttctacagct attgtggtt caccctgtat  
121 attctctatg tcttattgct cttctaataa aatcaatcat ttctactgtg atattgcacc  
181 tctgttagca ttacttgcct ctgatactta ctaccagaa gcaatagctc tcatactgc  
241 agcaacaaat ttggttttt ccatgattac agttctagta tcttattca atattgttt  
301 gtccattcta aggatgcatt catcagaagg aaggaaaaaa gcctttcca cctgtgcttc  
25 361 acatatgatg gcagtcacag tttctatgg gacaatgctg ttcatgtatt tgcagcccca  
421 aaccaaccac tcactggata ctgataagat ggcttctgtg tttacacat tggtgattcc  
481 tatgctg (SEQ ID NO:157).

**OR102**

30 LOCUS AF179723 487 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA140) gene, partial cds.  
ACCESSION AF179723  
KEYWORDS .

35 SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

40 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers  
source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"

55 gene <1..>487  
/gene="PPA140"

CDS <1..>487  
 /gene="PPA140"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
 FCADNVIPHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLILGSYARIVSSI  
 LKVPSSKGICKAFSTCGSHLSVVSIFYGTIIIGLYFCPSANSSTLKETVMGMMYTVVTP  
 ML" (SEQ ID NO:160).  
 BASE COUNT 82 a 141 c 108 g 156 t  
 ORIGIN  
 1 tgtggccatc tgcctccccc tgcactacac cgccatcatg agecccatgc tctgtctcgc  
 61 cctgggtggc ctgtctctggg tgcctgaccac ctcccatgcc atgttacaca ctttactcat  
 121 ggccagggtg tgttttgcg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 181 tctgctgaag ctggcctgct ctgacctcg agtcaatgaa ttggtgatat ttatcatggg  
 241 agggctgatt ctgtcatcc cattctact catccttggg tcctatgcac ggattgtctc  
 301 ctccatcctc aaggccctt cgtctaaggg tatctgcaag gcgttctcta cttgtggctc  
 361 ccacctctct gtggtgtcac tgtctatgg gaccattatt ggtctctact tctgcccatc  
 421 agctaatagt tctactctaa aggagactgt tatgggtatg atgtacactg tggtgaccgc  
 481 catgctg (SEQ ID NO:159).  
**OR103**  
 LOCUS AF179724 478 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA142) gene, partial cds.  
 ACCESSION AF179724  
 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..478  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>478  
 /gene="PPA142"  
 CDS <1..>478  
 /gene="PPA142"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLNYATIMSQPMCGFLMGVAGILGFVHGGIQTFLIAQLP  
 FCGPNVIDHFMCDLVPILLELACTDTHTLGPLIAANSGSLCFLIFSMLVASVVIILCSL  
 RTHISEGRHKALSSCTSHIFVVILFFVPCSYLYLRPLTSFPTDKAVTVFCTLFTPML"  
 (SEQ ID NO:162).

BASE COUNT 93 a 126 c 98 g 161 t

ORIGIN

1 tgtggccatc tgaagccct tgaactatgc aaccatcatg agtcaaccta tgtgtggatt  
61 cctgatgggg gtggctggga ttctgggatt tgtgcatgga gggatccaga ctctgttcat  
121 agcccagtta ccattctgtg gccccaatgt catcgaccac ttatgtgtg attagtacc  
181 tcttctagag ctggcctgca cagacactca cacctgggg cctctgatag ctgccaacag  
241 tggatcattg tgttctctca tttttccat gctggttgc tctatgtca tcatcctgtg  
301 ctccctaagg actcatactc ctgaaggcg tcacaaagct ctgtctagtt gtacctctca  
361 tatcttgggt gtcactttat tctttgccc ttgtcatac ctgtatctaa gacctctaac  
421 ctcttcccc actgacaaag ctgtgactgt gtttgcacc ctatttacac ctatgttg (SEQ ID NO:161).

OR104

LOCUS AF179725 487 bp DNA PRI 31-DEC-2000

15 DEFINITION Papio hamadryas olfactory receptor (PPA143) gene, partial cds.

ACCESSION AF179725

KEYWORDS .

SOURCE baboon.

20 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

25 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35 source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
/gene="PPA143"  
40 CDS <1..>487  
/gene="PPA143"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICKPLHYLNIMNRRVCTLLVFTSWLVSFLLIIFPALMLLLQLD  
YCRSNIMDHFTCDYFPLLQLACSDTKFLEVGMGFSCAVFTLMLTLALIFLSYIYIIRTI  
45 LRIPSASQRTKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLSKGVAILNTSVAP  
ML" (SEQ ID NO:164).

BASE COUNT 120 a 110 c 85 g 172 t

ORIGIN

1 tgtggccatc tgcaagcctc tgcattactt gaatatcatg aatcgaagag tctgcacact  
50 61 gcttgttttt acttcttggc tggtttcatt cttaatcata ttcccagcac tcatgttgc  
121 cttaacagctt gattactgta ggtctaatat tatggacat ttacctgtg attattttcc  
181 cctgctgcaa ctgcttgtt cagacacaaa attcctagag gtgatgggat ttcttgtgc  
241 tgtgtttact ctaatgttga ctttggcatt aatattctg tctacatat acattatcag  
301 aacaattttg agaattcctt ctgctagtca aaggacaaag gcctttcca catgttctc  
55 361 ccacatgatt gtcacttcca tctctatgg cagctgcatt ttatgtaca ttaaaccctc

421 agcaaaagat agagtgtcct tgagcaaggg agtggcaata ctaaacacct cagtagcccc  
481 catgctg (SEQ ID NO:163).

## OR105

5  
LOCUS AF179726 487 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA144) gene, partial cds.  
ACCESSION AF179726  
KEYWORDS .  
10 SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
15 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
20 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
25 FEATURES Location/Qualifiers  
source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
30 /gene="PPA144"  
CDS <1..>487  
/gene="PPA144"  
/codon\_start=2  
/product="olfactory receptor"  
35 /translation="VAICQPLHYSTLLSPWACMAMVGTSWLTGIITATTHAFLIFSLP  
FPSRPIIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI  
LAMASTQSRKVFSTCSSHLLVVSLLFFGTASITYIRPQAGSSVTTDRVLSLFYTVITP  
ML" (SEQ ID NO:166).  
BASE COUNT 85 a 184 c 95 g 123 t  
40 ORIGIN  
1 tgttgccatc tgccagcctc tgcactactc taccctcttg agcccatggg cctgcatggc  
61 catggtgggc acctcctggc tcacagggat catcacggcc accacccatg ccttcctcat  
121 cttctcteta cttttccca gccgccaat catccacac ttctctgtg acatcctgcc  
181 agtactgagg ctggcaagtg ctgggaagca caggagcgag atctctgtga tgacagccac  
45 241 tgtagctctc attatgatcc cttctctct gattgtcacc tcttacatcc gcatcctggg  
301 agccatccta gcgatggcct ccaccagag ccgccgcaag gtctctcca cctgtcctc  
361 ccatctgctc gtggtctctc tcttcttg aacagccagc atcacctaca tccggccgca  
421 ggcaggctcc tctgttacca cagaccgct cctcagctc ttctacacgg tcatcacacc  
50 481 catgctc (SEQ ID NO:165).

## OR106

LOCUS AF179727 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR183) gene, partial cds.  
55 ACCESSION AF179727



KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR183"  
CDS <1..>487  
/gene="PTR183"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICFPLHYTAIMSPMLCLSVVTLVSWVLTTFHAMLHTLLMARLC  
FCADNVIPHFFCDMSALLKLACSDTRVNEWVIFIMGGLIVVIPFLLILGSYARIVSSI  
LKVPSKKGICKALSTCGSHLSVVSIFYGTVIGLYLCPANSSTLKDTVMAMMYTVVTP  
ML" (SEQ ID NO:168).  
BASE COUNT 86 a 137 c 105 g 159 t  
ORIGIN  
1 tgtggccatc tgttccccc tgcactacac cgccatcatg agccccatgc tctgtctctc  
61 cgtgggtgacg ctgtctctggg tgcctgaccac ctccatgcc atgttacaca ctttactcat  
121 ggccagggtg tgttttgtg cagacaatgt gatcccccac ttttctgtg atatgtctgc  
181 tctactgaag ctggcctgct ctgacactcg agttaatgaa tgggtgatat ttatcatggg  
241 agggctcatt gttgcatcc cattctact catccttggg tcctatgcaa gaattgtctc  
301 ctccatcctc aaggtccctt ctctaaggg tatctgcaag gccttgctca cttgtggctc  
361 ccacctgtct gtggtgtcac tgttctatgg gaccgttatt ggtctctact tatgcccatc  
421 agctaatagt tctactctaa aggacactgt catggctatg atgtacactg tggtgacccc  
481 catgctg (SEQ ID NO:167).

# OR107

LOCUS AF179728 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR203) gene, partial cds.  
ACCESSION AF179728  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
10 /organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR203"  
CDS <1..>487  
15 /gene="PTR203"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICFPLHYTAIMSPMLCLSVVALSWVLTTFHAMLHTLLMARLC  
FCADNVIPHFFCDMSALLKLACSDTRVNEWVIFIMGGLIVVIPFLLILGSYARIVSSI  
20 LKVPSSKGICKALSTCGSHLSVVSIFYGTVIGLYLCPANSSTLKDVTMMAMMYTVVTP  
ML" (SEQ ID NO:170).  
BASE COUNT 85 a 137 c 106 g 159 t  
ORIGIN  
25 1 tgtggccatc tgttcccc tgcaactac cgcccatcg agcccatgc tctgtctc  
61 cgtgggtggc ctgtcctggg tgctgaccac ctccatgcc atgttacaca ctttactcat  
121 ggccagggtg tgttttgg cagacaatgt gatccccac ttttctgtg atatgtctgc  
181 tctactgaag ctggcctgct ctgacactcg agttaatgaa tgggtgatat ttatcatggg  
241 agggctcatt gttgcatcc cattctact catccttggg tcctatgcaa gaattgtctc  
30 301 ctccatcctc aaggctcctt ctctaaggg tatctgcaag gccttgctta ctgtggctc  
361 ccacctgtct gtgggtgtcac tgttctatgg gaccgttatt ggtctctact tatgcccatc  
421 agctaatagt tctacttaa aggacactgt catggctatg atgtacactg tgggtgacccc  
481 catgctg (SEQ ID NO:169).  
35 **OR108**  
LOCUS AF179729 485 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes PTR204 pseudogene, partial sequence.  
ACCESSION AF179729  
40 KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
45 REFERENCE 1 (bases 1 to 485)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
50 REFERENCE 2 (bases 1 to 485)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
55 FEATURES Location/Qualifiers

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source      1..485
             /organism="Pan troglodytes"
             /db_xref="taxon:9598"
gene        <1..>485
             /gene="PTR204"
             /pseudo
BASE COUNT  130 a 107 c 77 g 171 t
ORIGIN
    1 tgtagccata tgtaatccct tgctttatcc agtgaatgat tccaacaaac tcagcgctca
  10    61 gttgctaagc atttcatatg taattgggtt cctgcaccc cttgttcacg tgagtttact
    121 attgcgacta accttctgca gggttaacat aatacattat ttctactgtg aaattttaca
    181 actgttcaaa atttcatgca atgtgtccatc tattaacgca ctaatgatat ttattttgg
    241 tgctttata caaataccca cttaaatgac gatcataatc tcttatactc gtgtgctctt
    301 tgatattctg aaaaaaaagt ctgaaaaggg cagaagcaaa gccttctcca catgcagcgc
  15    361 ccatctgctt tctgtctcat tgtactacgg aactctgac ttcatgtatg tgcgtcctgc
    421 atctggccta gctgaagacc cagacaaagt gtattctctt ttacacgatt ataattcccc
    481 tgcta (SEQ ID NO:171).

OR109

LOCUS      AF179730 487 bp DNA PRI 31-DEC-2000
DEFINITION Pan troglodytes olfactory receptor (PTR205) gene, partial cds.
ACCESSION  AF179730
KEYWORDS
SOURCE     chimpanzee.
ORGANISM   Pan troglodytes
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Catarrhini; Hominidae; Pan.
REFERENCE  1 (bases 1 to 487)
  30    AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE   The olfactory receptor gene repertoire in primates and mouse:
            Evidence for reduction of function in primates
        JOURNAL  Unpublished
REFERENCE  2 (bases 1 to 487)
  35    AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE   Direct Submission
        JOURNAL  Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
            1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
FEATURES   Location/Qualifiers
  40    source      1..487
            /organism="Pan troglodytes"
            /db_xref="taxon:9598"
        gene        <1..>487
            /gene="PTR205"
  45    CDS         <1..>487
            /gene="PTR205"
            /codon_start=2
            /product="olfactory receptor"
            /translation="VAICRPLCYSTVTRPQVCALMLALCWVLTNIIALTHTFLMARLS
  50    FCVTGEIAHFFCDITPVCLKLSCSDTHINEMMVFVLGGTVLIVPFLCIVTSYIHIVPAI
            LRVTRGGVGKAFSTCSSHLCCVVCVFYGTFLFSAYLCPPSIASEEKDIAAAAMYTIVTP
            ML" (SEQ ID NO:173).
BASE COUNT  83 a 148 c 110 g 146 t
ORIGIN
  55    1 tgtggccatt tgccgcccc tctgtactc cacagtcacg aggccccaag tctgtgccct

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5      61 aatgcttgca ttgtctggg tcctcacaa tatcattgcc ctgactcaca cggtcccat
      121 ggctcgggtg tccttctgtg tgactgggga aattgctcac ttttctgtg acatcactcc
      181 tgtcctgaag ctgtcatgtt ctgacacca catcaacgag atgatggtt ttgtctggg
      241 aggcaccgta ctcatcgtcc ccttttatg cattgcacc tcctacatcc acattgtgcc
10     301 agctatcctg aggggccgaa cccgtggtgg ggtgggcaag gcctttcca cctgcagttc
      361 ccacctctgc gttgtttgtg tgttctatgg gacgctctc agtgcctacc tgtgcctcc
      421 ctccattgcc tctgaagaga aggacattgc agcagctgca atgtacacca tagtgactcc
      481 catgttg (SEQ ID NO:172).

10     OR110

      LOCUS AF179731 487 bp DNA PRI 31-DEC-2000
      DEFINITION Pan troglodytes olfactory receptor (PTR206) gene, partial cds.
      ACCESSION AF179731
15     KEYWORDS .
      SOURCE chimpanzee.
      ORGANISM Pan troglodytes
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Catarrhini; Hominidae; Pan.
20     REFERENCE 1 (bases 1 to 487)
      AUTHORS Giorgi,D.G. and Rouquier,S.P.
      TITLE The olfactory receptor gene repertoire in primates and mouse:
            Evidence for reduction of function in primates
      JOURNAL Unpublished
25     REFERENCE 2 (bases 1 to 487)
      AUTHORS Giorgi,D.G. and Rouquier,S.P.
      TITLE Direct Submission
      JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
            1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
30     FEATURES Location/Qualifiers
            source 1..487
            /organism="Pan troglodytes"
            /db_xref="taxon:9598"
            gene <1..>487
            /gene="PTR206"
35     CDS <1..>487
            /gene="PTR206"
            /codon_start=2
            /product="olfactory receptor"
40     /translation="VAICHPLHYSTIMALRLCASLVAAPWVIAILNPLLHTLMM AHLH
            FCSDNVIHHFFCDINSLPLSCSNTSLNQLSVLATVGLIFVPSVCILVSYILIVSAV
            MKVPSAQGKLKAFSICGSHLALVILFYGAITGVYMSPLSNHSTEKDSAASVIFMVVAP
            VL" (SEQ ID NO:175).
45     BASE COUNT 90 a 138 c 91 g 168 t
      ORIGIN
            1 cgtggccatc tgcaccctt tacattactc caccattatg gccctgcgcc tctgtgccic
            61 tctgtagctg gcaccttggg tcattgccat ttgaaccct ctcttgaca ctcttatgat
            121 ggcccatctg cacttctgct ctgataatgt tatccacat tcttctgtg atatcaactc
50     181 tctctccctc ctgtcctgtt ccaacaccag tctaatcag ttgagtgttc tggtacgggt
            241 ggggctgac tttgtgttac ctacagtgtg tatectggtc tcctatatcc tcattgttcc
            301 tctgtgatg aaagtcctt ctgcccaagg aaaactcaag gctttctcta tctgtggatc
            361 tcacctgcc ttggtcattc ttttctatgg agcaatcaca ggggtctata tgagccctt
            421 atccaatcac tctactgaaa aagactcagc cgcacagtc attttatgg ttgtagcacc
55     481 tgtgttg (SEQ ID NO:174).

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## OR111

5 LOCUS AF179732 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR207) gene, partial cds.  
ACCESSION AF179732  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
25 /db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR207"  
CDS <1..>487  
/gene="PTR207"  
30 /codon\_start=2  
/product="olfactory receptor"  
/translation="VAVCNPLLYTVAMYQRLCSLLVATSYCWGRVCSLTLTLYFLELS  
FRGNNIINN FVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLVITLTSYAFIFITV  
MKTASIGGRKKAFFTCASHLTAITIFHGTLFLYCVPNSKSSWLMVKVASVFYTVVIP  
35 ML" (SEQ ID NO:177).  
BASE COUNT 99 a 122 c 103 g 163 t  
ORIGIN  
1 tgtggcgggtg tgtaaccctc ttctctacac agttgcaatg taccagaggc ttgctcctt  
61 gttggtggct acatcatact gttgggggag agtctgttcc ctgacactta cctactttct  
40 121 actggaatta tccttcagag gaaataatat cattaataac ttgtctgtg agcatgctgc  
181 cattgttgc gtgtcttgc ctgacccta tgtgagccag gagatcact tagtttctgc  
241 cacattcaat gaaataagca gcctgggat cacttcact tcctatgctt tcatTTTTAT  
301 cactgtcatg aagacggctt ccattggggg gcgcaagaaa gcgttctca cgtgtgcctc  
361 ccacttgacg gccattacca ttttccatgg gactattctt ttctctact gtgttcctaa  
45 421 ctcaaaaagt tcgtggctca tggccaaggt ggccctctgtc ttttacacag tggtcattcc  
481 catgctg (SEQ ID NO:176).

## OR112

50 LOCUS AF179733 481 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR208) gene, partial cds.  
ACCESSION AF179733  
KEYWORDS .  
SOURCE chimpanzee.  
55 ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 481)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 481)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..481  
15 /organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
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/gene="PTR208"  
CDS <1..>481  
20 /gene="PTR208"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LAICQPLRYPVLMNGRLCTVLVAGACVAGSMHGSIQATLTFRLP

25 YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDVGVVAASCFMLILLSYANIVNAI  
LKIRTTDGRHRAFSTCGSHLIVVTVYYVPCIFIYLRAGSKGPLDGAAVFYTVVTPLL" (SEQ ID NO:179).  
BASE COUNT 85 a 141 c 124 g 131 t  
ORIGIN  
30 1 cctggcaata tgcagcccc tgcgctaccc agtgcctcatg aatgggaggt tatgcacagt  
61 cctgtggct ggagcttgtg tcgccggctc catgcatggg tctatccagg ccaccctgac  
121 ctccgcctg ccctactgtg ggcccaatca ggtggattac ttatctgtg acatccccgc  
181 agtattgaga ctggcctgtg ctgacacaac tgcattgag cttgtgacct ttgtggacgt  
241 cggggtggtg gccccagtt gcttcatgtt aattctgctc tcgtatgcca acatagtaaa  
35 301 tgccatcctg aagatacgca ccactgatgg gaggcaccgg gccttctcca cctgtggctc  
361 ccacctaate gttgtcacag tctactatgt cccctgtatt tcatctacc ttagggtgctg  
421 ctccaaaggc ccctggatg gggcgcgccg tgtgtttac actgtgtca ctccattact  
481 g (SEQ ID NO:178).

40 **OR113**

LOCUS AF179734 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR209) gene, partial cds.  
ACCESSION AF179734  
45 KEYWORDS  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

50 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

55 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 5 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 10 gene <1..>487  
 /gene="PTR209"  
 CDS <1..>487  
 /gene="PTR209"  
 /codon\_start=2  
 /product="olfactory receptor"  
 15 /translation="VAICHPLYRIVNPRLCGLLVLSWFLSLSYSLLIQSLLMLQVS  
 FCTSWVIQHFYCELAQVLTLCSDTHVNYILLYVVTGLLDFVPFSGILFSYTIQIVSYI

LRISSTDGKHKAFSTCGSHLFVVSIFYGTGLGVYLSNASSSSWWGMVASVMYTVVTP  
 ML" (SEQ ID NO:181).  
 20 BASE COUNT 79 a 144 c 107 g 157 t  
 ORIGIN  
 1 cgtggccatc tgtaccccc tgtactaccg tgtcatcgtg aacccccgcc tctgtggcct  
 61 gctggttctt gtgtcctggt tctcagctt gtcatactcc ctgatccaga gctgttgat  
 121 gctgcagggt tcttctgta ccagttgggt cattcagcac tttactgtg agcttgctca  
 25 181 ggctctcag cttactgct cagacacaca cgtaattac atctgctgt acgtgggtgac  
 241 tggecttctg gactttgtgc cttctcagg gatcctttc tctacaccc aaattgtctc  
 301 ctacatccta agaattcat ccacagatgg gaaacacaaa gccttttcta cctgtggatc  
 361 tcactgttt gtggtttctt tattctatgg gacaggcctt ggtgtgtatc ttagtccaa  
 421 tgcacgtcc tcttctggt ggggcatggt ggcctcggtc atgtacactg tggcaccccc  
 30 481 catgctg (SEQ ID NO:180).

## OR114

LOCUS AF179735 487 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Pan troglodytes olfactory receptor (PTR210) gene, partial cds.  
 ACCESSION AF179735  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Pan troglodytes"  
 55 /db\_xref="taxon:9598"

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gene      <1..>487
          /gene="PTR210"
CDS       <1..>487
          /gene="PTR210"
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          /product="olfactory receptor"
          /translation="VAICNPLLYPVMMSNKLSAQLLSISYVIGFLHPLVHVSLLLRLT
          FCRFNIIHYFYCEILQLFKISCNGPSINALMIFIFGAFIQIPTLMTIIISYSRVLFDI
          LKKKSEKGRSKAFSTCSAHLSSVSLYYGTLIFMYVRPASGLAEDPDKVYSLFYTIHP
          LL" (SEQ ID NO:183).
BASE COUNT  129 a  107 c   78 g  173 t
ORIGIN
    1 ttagccata tgtaatccct tgettatcc agtgatgatg tccaacaaac tcagcgctca
   61 gttgctaagc attcatatg taattggtt cctgcatcct ctggttcag tgagtttact
  121 attgcgacta actttctgca ggttaacat aatacattat ttctactgtg aaattttaca
  181 actgttcaaa attcatgca atggtccatc tattaacgca ctaatgatat ttatttttgg
  241 tgcitttata caaataccga cttaatgac gatcataatc tctattctc gtgtgctctt
  301 tgatattctg aaaaaaaaagt ctgaaaaggg cagaagcaaa gcctttccca catgcagcgc
  361 ccatctgctt tctgtctcat tgtactacgg aactctgac ttcattgatg tgcgtcctgc
  421 atctggccta gctgaagacc cagacaaagt gtattctctg tttacacga ttataattcc
  481 cctgcta (SEQ ID NO:182).

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# OR115

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25 LOCUS  AF179736  487 bp  DNA      PRI   31-DEC-2000
    DEFINITION  Pan troglodytes olfactory receptor (PTR211) gene, partial cds.
    ACCESSION  AF179736
    KEYWORDS
    SOURCE  chimpanzee.
30 ORGANISM  Pan troglodytes
        Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
        Eutheria; Primates; Catarrhini; Hominidae; Pan.
    REFERENCE  1 (bases 1 to 487)
        AUTHORS  Giorgi,D.G. and Rouquier,S.P.
35 TITLE  The olfactory receptor gene repertoire in primates and mouse:
        Evidence for reduction of function in primates
    JOURNAL  Unpublished
    REFERENCE  2 (bases 1 to 487)
        AUTHORS  Giorgi,D.G. and Rouquier,S.P.
40 TITLE  Direct Submission
    JOURNAL  Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
        1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
    FEATURES             Location/Qualifiers
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        gene            <1..>487
                     /gene="PTR211"
        CDS             <1..>487
50                     /gene="PTR211"
                     /codon_start=2
                     /product="olfactory receptor"
                     /translation="VAICHPLRYTVLMNIHFCGLLLLSRFMSTMDALVQSLMIFQLS
                     FCKNVEIPLFFCEVVQVIKLACSDTLINNILIYFASSIFGAIPLSGIIFSQIVTSV

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LRMPSARGKYKAFSTCGCHLSVFSLFYGTAFGVSISSAVAESSRITAVGSVMYTVVPQ

MM" (SEQ ID NO:185).

BASE COUNT 102 a 120 c 98 g 167 t

ORIGIN

1 tgtggccatt tgccaccac tgaggtaac agtcctcatg aacatccatt tctgcggctt  
61 gctgattctt ctctccagg tcatgagcac tatggatgcc ctggttcaga gtctgatgat  
121 atttcagctg tccttcgca aaaacgtga aatcccttgg ttctctgtg aagtcgtca  
181 ggcatcaag ctgcctgtt ctgacacct catcaacaac atcctcatat atttgaag  
241 tagcatattt ggtgcaattc ctctctctgg aataatttc tcttattctc aaatagtcac  
301 ctctgttctg agaatgcat cagcaagagg aaagtataaa gcgtttcca cctgtggctg  
361 tcacctctct gtttttctt tgttctatgg gacagctttt ggggtgtcca ttagttctgc  
421 tgttctgtag tcttccgaa ttactgtgt ggggtcagtg atgtacactg tgggtccaca  
481 aatgatg (SEQ ID NO:184).

## OR116

LOCUS AF179737 487 bp DNA PRI 31-DEC-2000

DEFINITION Pan troglodytes olfactory receptor (PTR212) gene, partial cds.

ACCESSION AF179737

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Pan troglodytes"

/db\_xref="taxon:9598"

gene <1..>487

/gene="PTR212"

CDS <1..>487

/gene="PTR212"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLHYTVIMREELCVFLVAVSWILSCASSLSHTLLLRSL

FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMCILVSYGYIGATI

LRVPSTKGIHKALSTCGSHLSVVSLLYGSIFGQYLFPTVSSSIDKDIVALMYTVVTP

ML" (SEQ ID NO:187).

BASE COUNT 87 a 141 c 105 g 154 t

ORIGIN

1 tgttgccata tgtcacctc tccactacac tgtcatcatg aggggaagagc tctgtgtctt  
61 cttagtggtc gtatcttggg ttctgtcttg tgccagctcc ctcttcaca cctctctct  
121 gaccgggctg tcttctgtg ctgcgaacac catccccat gtctctgtg acctgtctgc  
181 cctgtctaag ctgtctgtc cagatatctt cctcaatgag ctgggtcatg tcacagtagg

241 ggtgggtggtc attaccctgc cattcatgtg tatcctggta tcatatggct acattggggc  
 301 caccatcctg aggggtccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
 361 ccatctctct gtgggtcttc tctattatgg gtcaatattt ggccagtacc ttttcccgac  
 421 tgtaagcagt tctattgaca aggatgtcat tgtggctctc atgtacacgg tggtcacacc  
 481 catgttg (SEQ ID NO:186).

## OR117

LOCUS AF179738 484 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar HLA121 pseudogene, partial sequence.  
 ACCESSION AF179738  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>484  
 /gene="HLA121"  
 /pseudo  
 BASE COUNT 88 a 145 c 118 g 133 t  
 ORIGIN  
 1 tgttgctatc tgcctgccgc ttaggtatcc agagctcatg agtgggcaga cctgcatgca  
 61 gatggcagca ctgagctggg ggacaggctt tgccaactca ctgctacagt ccattcctgt  
 121 ctggcgcttc ccttctgtg gccacaacgt catcaaccac ttttctgtg agatcttggc  
 181 agtgcataaa ctggcctgtg gggacatctc cctcaatgcg ctggcattaa tgggtggccac  
 241 agctgtcctg acaactggccc ccctcttctc catctgcctg tcttaccttt tcatcttgtc  
 301 tgccatcctt aggtaccct ctgctgcagg ccggcgcaaa gccttctcca cctgctcagc  
 361 ccacctcaca gtgggtgtgg tttttaagg gacaatttcc tcatgtact tcaaacccaa  
 421 ggccaaggac cccaacgtgg ataagattgt tgcattgtg tatggggttg tgacaccctc  
 481 gctg (SEQ ID NO:188).

## OR118

LOCUS AF179739 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA122) gene, partial cds.  
 ACCESSION AF179739  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
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 gene <1..>487  
 /gene="HLA122"  
 CDS <1..>487  
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 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAVCNPLLYTVAMSQR LCSLLVATSYSWGIVCFLTLTYF LLELS  
 FRGNNIINN FVCEHAAIVAVSCDPYVSQEITLVSATFNEISSLMMIFTSYAFITV  
 MKMPSTGGRKKAFTCASHLTAITIFHG TILFPYCVPSKSSWLMVKVTSVFYTVFIP  
 MV" (SEQ ID NO:190).  
 BASE COUNT 101 a 124 c 97 g 165 t  
 ORIGIN  
 1 tgtggcggtg tgtaaccctc ttctctacac agtgcaatg tccagaggc ttgtcctt  
 61 gttgtggct acatcatact ctgggggat agtctgttc ctgacctta cctactttc  
 121 actggaatta tcctcagag gaaataatat cattaataac ttgtctgtg agcatgctgc  
 181 cattgttgc gtgtcttgc ctgacccta tgtgagccag gagatcact tagtttctgc  
 241 cacattcaat gaaataagca gtctgatgat gatttcact tcctatgctt tcattttat  
 301 cactgtcatg aagatgcctt ccaactggggg gcgcaagaaa gcgttctcca cgtgtgcctc  
 361 ccacctgacc gccattacca tttccatgg gactatcctt ttccctact gtgttctaa  
 421 ctccaaaagt tcatggctca tggtaagggt gacctctgc tttacacag tgttcattcc  
 481 catggtg (SEQ ID NO:189).

## OR119

LOCUS AF179740 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA123) gene, partial cds.  
 ACCESSION AF179740  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..486  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>486  
/gene="HLA123"  
CDS <1..>486  
/gene="HLA123"  
10 /codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLLAQLS  
FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
15 M" (SEQ ID NO:192).

BASE COUNT 95 a 144 c 93 g 154 t

ORIGIN

1 tgtggccatc tgtcacctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtggc gggctcctgg tcactgcttg tgcgtgtgct ctttgcata cctcctcct  
20 121 ggcccagctt tcctttgtg ctgaccacat catccctcac ttctctgtg accttgggtc  
181 cctgtcaag ttgtctgct catagacctc cctcaatcag ttggcaatct ttacagcagg  
241 attgacagcc attatgctc cattctgtg catcctgggt tcttatggc acattggggt  
301 caccatcctc cagattccct ctaccaaggg catatgcaaa gccttgcca ctgtggatc  
361 ccaccttca ggtgtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
25 421 atccagcaac accaatgaca agaacataat tgcctcagtg atatacacag tagtactcc  
481 catgtt (SEQ ID NO:191).

## OR120

30 LOCUS AF179741 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA124) gene, partial cds.  
ACCESSION AF179741  
KEYWORDS .  
35 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
40 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

50 source 1..487  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA124"  
CDS <1..>487  
55 /gene="HLA124"

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/codon_start=2
/product="olfactory receptor"
/translation="VAICSPLHYPMVIMNQRTRAKLAAASWFGFPVATVQTTWLFSP
5 FCGTNKVNHHFCDSPVLRVLCADTALFEIYAIVGTILVVMIPCLLILCSYTHIAAAI
LKIPSAKGKNKAFSTCSSHLLVVSIFYISLSLTYFRPKSNNSPEGKKLLSLSYTVVTP
ML" (SEQ ID NO:194).
BASE COUNT 102 a 141 c 96 g 148 t
ORIGIN
10 1 tgtggccatc ttagtcctc tgcactaccc agtcatcatg aaccaaagga ctctgccc
61 actggctgct gcctcctggg tcccaggctt tctgtagct actgtgcaga ccacatggct
121 cttcagtttt ccattctgtg gcaccaacaa ggtaaacacc ttctctgtg acagcccgcc
181 tgtgctgagg ctggtctgtg cagacacagc actgtttgag atctacgcca tctcggaac
241 cattctgtg gtcgatgcc ctgtctgct gatctgtgt tctatactc acattgctgc
301 tgccatcctc aagatcccat cggctaaagg gaagaataaa gccttctcta cgtgttctc
15 361 acacctcctt gttgtctctc tttctatat atcattaagc ctcacatatt ttcggcctaa
421 atcaataaat tctcctgagg gcaagaagct gctatcattg tctacactg ttgtgactcc
481 catgttg (SEQ ID NO:193).

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## OR121

```

20 LOCUS AF179742 487 bp DNA PRI 31-DEC-2000
DEFINITION Hylobates lar olfactory receptor (HLA125) gene, partial cds.
ACCESSION AF179742
KEYWORDS
25 SOURCE common gibbon.
ORGANISM Hylobates lar
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.
REFERENCE 1 (bases 1 to 487)
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory receptor gene repertoire in primates and mouse:
Evidence for reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 487)
35 AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
40 source 1..487
/organism="Hylobates lar"
/db_xref="taxon:9580"
gene <1..>487
/feature="HLA125"
45 CDS <1..>487
/feature="HLA125"
/codon_start=2
/product="olfactory receptor"
/translation="VAICKPLHYLNIMNRRVCILLVFTSWLISFLIIFPALMLLLKLD
50 YCRSNIIDHFTCDYFPLLQLACSDTKFLEVMAFSCAVFTLMFTLALISLSYIYIIRTI
LRIPSTSQRKAFSTCSSHMMVISISYGSCIFMYIKPSAKDRVSLSKGVAILNTSVAP
MM" (SEQ ID NO:196).
BASE COUNT 121 a 107 c 82 g 177 t
ORIGIN
55 1 tgtggccatc tgcaagcctc tgcattactt gaatatcatg aatcgaagag tctgcatact

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61 gcttgtttt acttcttggc tgatttcatt cttaatcata ttccctgcac tcattgtgt  
 121 cttaaagcct gattactgta ggtctaata tattgacat ttacctgtg attatttcc  
 181 cctgctgcaa ctgctgtt cagacacaaa attcttagag gtgatggcat tttctgtgc  
 241 tgtgttact ctaatgttca ctgggcatt aatatctctg tctacatat acattatcag  
 301 aacaattttg agaattcctt ctactagtca gaggacaaag gccttttcca catgttctc  
 361 ccacatgggt gttatttcca tctcttatgg cagctgcatt ttatgtaca ttaaccctc  
 421 agcaaaagat agagtgtcct tgagcaaggg agtggcaata ctaaacacct cagtagcccc  
 481 catgatg (SEQ ID NO:195).

**OR122**

LOCUS AF179743 484 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA126) gene, partial cds.  
 ACCESSION AF179743  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..484  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>484  
 /gene="HLA126"  
 CDS <1..>484  
 /gene="HLA126"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYTVIMREELCVFLVAISWILSCASSLSHTLLLTRLS  
 FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
 LRVPTKGIHKASTCGSHLSVVSLLYYGSIFGQYLFPTASSSIDKDVIVAVMYTVITPM  
 L" (SEQ ID NO:198).  
 BASE COUNT 88 a 143 c 104 g 149 t  
 ORIGIN  
 1 tgttgccata tgtcaccctc tcactacac tgtcatcatg agggagagac tctgtgtt  
 61 cttagtggtc atatcttggg ttctgtcttg tgccagctcc ctctctaca ccttctcct  
 121 gacccggctg tctttctgtg ctgcgaacac catccccac gtcttctgtg acctgtctgc  
 181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
 241 ggtgtgtgtc attaccctgc cattcatgtg tatcctggta tcatatggtc acattggggc  
 301 caccatcctg agggctccct caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
 361 tcttctgtg gtgtctctc attatgggtc aatattggc cagtacctt tcccgaccgc  
 421 aagcagtcc attgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
 481 gttg (SEQ ID NO:197).

## OR123

LOCUS AF179744 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA127) gene, partial cds.  
ACCESSION AF179744  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA127"  
CDS <1..>487  
/gene="HLA127"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLLAQLS  
FCADHIIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSICGSHLSVVTIYYGTIIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:200).  
BASE COUNT 95 a 143 c 94 g 155 t  
ORIGIN  
1 tgtggccatc tgtcacctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctggtggtc ggtcctggg tcatcgcttg tgcgtgtgct ctttgcata cctcctcct  
121 ggcccagctt tcctttgtg ctgaccacat catccctcac ttctctgtg accttggtgc  
181 cctgctcaag ttgctctgct cagatactc cctcaatcag ttggcaatct ttacagcagg  
241 attgacagcc attatgcttc cattctgtg catcctgggt tcttatggtc acattggggt  
301 caccatctc cagattccct ctaccaaggg catatgcaaa gccttgcca ttgtggatc  
361 ccacctctca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:199).

## OR124

LOCUS AF179745 484 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA128) gene, partial cds.  
ACCESSION AF179745  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..484  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>484  
 /gene="HLA128"  
 CDS <1..>484  
 /gene="HLA128"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYTVIMREELCVFLVAVSWILSCASSLSHTLLLTRLS  
 FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
 LRPSTKGIHKASTCGSHLSVVSLEYGSIFGQYLFPTASSIDKDVIVAVMYTVITPM  
 L" (SEQ ID NO:202).

BASE COUNT 87 a 143 c 105 g 149 t

ORIGIN  
 1 tgtgccata tgtcacccctc tccactacac tgtcatcatg agggagagc tctgtgtctt  
 61 cttagtggtc gtatcttggg ttctgtcttg tgccagctcc ctctctcaca cccttctcct  
 121 gacccggctg tctttctgtg ctgcgaacac catccccac gtctctgtg accttgctgc  
 181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggcatgt tcacagtagg  
 241 ggtgggtgct attaccctgc cattcatgtg tatcctggta tcatatggct acattggggc  
 301 caccatcctg agggtcctt caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
 361 tctttctgtg gtgtctctct attatgggc aatattggc cagtacctt tcccgaccgc  
 421 aagcagtcc attgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
 481 gttg (SEQ ID NO:201).

## OR125

LOCUS AF179746 484 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA129) gene, partial cds.  
 ACCESSION AF179746  
 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission



JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..484  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>484  
/gene="HLA129"  
10 CDS <1..>484  
/gene="HLA129"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLLAQLS  
FCADHIIIPHFFCDLGALLKLSCSDTFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
15 LRV PSTKGIHKASTCGSHLSVVS LYYGSIFGQYLFPTASSSIDKDVIVAVMYTVITPM  
L" (SEQ ID NO:204).

BASE COUNT 85 a 139 c 111 g 149 t

ORIGIN

1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
20 61 gctgggtggc gggctcctgg tcacgtctg tgcgtgtgct ctttgcata cctcctcct  
121 ggcccagctt tcctttgtg ctgaccacat catcctcac ttcttctgtg accttgggtc  
181 cctgctcaag ttgtcctgct cagatacctt cctcaatgag ctggctcatgt tcacagtagg  
241 ggtgggtggc attaccctgc cattcatgtg tatcctggtg tcatatggct acattggggc  
301 caccatcctg agggtcctt caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
25 361 ttcttctgtg gtgtctctct attatgggtc aatattggc cagtacctt tcccgaccgc  
421 aagcagttcc attgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
481 gttg (SEQ ID NO:203).

OR126

30 LOCUS AF179747 486 bp DNA PRI 31-DEC-2000

DEFINITION Hylobates lar HLA130 pseudogene, partial sequence.

ACCESSION AF179747

KEYWORDS

35 SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 486)

40 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

45 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

50 source 1..486  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>486  
/gene="HLA130"  
55 /pseudo

BASE COUNT 95 a 142 c 94 g 155 t

ORIGIN

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61 ctgggtggctg ggtcctgggt catcgcttgt gcgtgtgctc tttgcatac cctcctcctg  
121 gcccagcttt cctttgtgc tgaccacatc atccctcact tcttctgtga ccttgggtgcc  
181 ctgctcaagt tgcctgctc agatacctcc ctcaatcagt tggcaatctt tacagcagga  
241 ttgacagcca ttatgctcc attctgtgc atcctggttt cttatgttca cattggggtc  
301 accatcctcc agattcctc taccaagggc atatgcaaag ccttgtccat ttgtggatcc  
361 cacctctcag tgggtgactat ctattatggg acaattattg gtctctattt tcttcccca  
421 tcagcaaca ccaatgacaa gaacataatt gcttcagtga tatacacagt agtcactccc  
481 atgttg (SEQ ID NO:205).

OR127

15 LOCUS AF179748 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA131) gene, partial cds.  
ACCESSION AF179748  
KEYWORDS .

20 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
25 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
30 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
35 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA131"  
CDS <1..>487  
40 /gene="HLA131"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICRPLYYPVIMKPHLCGLLVLSWFLSLSYSLSLIQSLLMLRVS  
FCTSWVIQHFYCELAQVLTACSDTHINYILLYMVTGLLGFVPFSGILFSYTIQIVSSI

45 LRISSPDGKHKAFSTCGSHLSVVSIFYGTGLGVYLLSSNASSSSWRGMVASVMYTVVTP  
NV" (SEQ ID NO:207).

BASE COUNT 80 a 145 c 106 g 156 t

ORIGIN

50 1 tgtggccatc tgtgcccc tgtactaccc tgtcatcatg aaacctcacc tctgtggcct  
61 gctggttctt gtgtcctggt tcttcagctt gtcatactcc ctgatccaga gtctgttgat  
121 gctgcgggtg tcttctgca ccagtgggt cattcagcac ttctactgtg agcttgctca  
181 ggtcctcacg ctgctgtgt cagacacaca catcaattac atctgtctct acatgggtgac  
241 cggccttttg ggctttgtgc ccttctcagg gatccttttc tctacaccc aaatcgtctc  
55 301 ctccatcctg agaatctcat ccccatgatgg gaaacacaaa gccttttcta cctgtggatc

361 tcactgtct gtggtttctt tattctatgg gacaggtctt ggcgtgtatc ttagttccaa  
 421 tgcacgtcc tcttctggc ggggcatggt ggcttcgga atgtacactg tgtaacccc  
 481 caatgtg (SEQ ID NO:206).

## 5 OR128

LOCUS AF179749 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA132) gene, partial cds.  
 ACCESSION AF179749  
 10 KEYWORDS .  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 15 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 20 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 25 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>487  
 30 /gene="HLA132"  
 CDS <1..>487  
 /gene="HLA132"  
 /codon\_start=2  
 /product="olfactory receptor"  
 35 /translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACALLHTLLLAQLS  
 FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
 LQTPSTKGICKALSICGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIASVIYTVVTP  
 ML" (SEQ ID NO:209).

BASE COUNT 95 a 144 c 94 g 154 t  
 40 ORIGIN

1 tgtggccatc tgtcacctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
 61 gctgggtgct gggctctggg tcatcgcttg tgcgtgtgct ctttgcata ccctcctcct  
 121 ggcccagctt tccttttggt ctgaccacat catccctcac ttctctgtg accttggtgc  
 181 cctgetcaag ttgtctgct cagatacctc cctcaatcag ttggcaatct ttacagcagg  
 45 241 attgacagcc attatgcttc cattctgtg catcctggtt tcttatggtc acattggggt  
 301 caccatcctc cagactccct ctaccaaggg catatgcaaa gccttgcca ttgtggatc  
 361 ccaccttca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
 421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
 50 481 catgtg (SEQ ID NO:208).

## OR129

LOCUS AF179750 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO100) gene, partial cds.  
 55 ACCESSION AF179750

KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Gorilla gorilla"  
         /db\_xref="taxon:9593"  
     gene <1..>487  
         /gene="GGO100"  
     CDS <1..>487  
         /gene="GGO100"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICHPLHYTFIMDQNTCIQLAVISWSSSFLCSMVINVLTLSP  
         YCGPNILNHFFCEVPTVLRLSCTDTSFTELVVFIIFSIIIVFIPFLIVVSYVRILQSV  
         LRMRSASGRYKALSTCTSHLTVVTLFYGTAILMYMRPQSRSSWAGGKIIAVFYTVVTP  
         ML" (SEQ ID NO:211).  
 BASE COUNT 91 a 130 c 97 g 169 t  
 ORIGIN  
     1 tgtagccatt tgcatacctc ttcattatac cttcattatg gaccaaaca cctgcattca  
     61 actggcagtt atttcttggt ccagtagctt cctgtgttc atggtatca atgttctcac  
     121 gttgagtttg cctactgtg gccctaatat cctgaatcac ttttctgtg aggtacctac  
     181 tgcctgagg ttgtcttgca ccgacacctc attcacggag ctggttggtt ttatcttcag  
     241 tatcatcatt gtcttcaccc ctttctcct cattgtgtt tcctatgtcc ggatecctca  
     301 atctgttctc aggatgcggt cagcctccgg gcggtataag gcattatcca cctgtacctc  
     361 ccatttgaca gtggtaacct tatttatgg gactgccatc ctcatgtaca tgagaccaca  
     421 gtcgaggtct tcctgggctg gcggcaagat cattgcggtt ttctacacgg tggtcacacc  
     481 catgctt (SEQ ID NO:210).  
**OR130**  
 LOCUS AF179751 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla GGO101 pseudogene, partial sequence.  
 ACCESSION AF179751  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..488  
         /organism="Gorilla gorilla"  
         /db\_xref="taxon:9593"  
     gene <1..>488  
         /gene="GGO101"  
         /pseudo  
 BASE COUNT 91 a 144 c 113 g 140 t  
 ORIGIN  
     1 tgtggccatt agccaccac ttactatcc catcctcatg aatcagaggg tctgtctcca  
     61 gattaccggg agctcctggg ccttgggat aatcgatggc ttgatccag atggtggtag  
     121 taatgaattt cccctactgt ggcttgagga aggtgaacca ttcttctgt gagatgctat  
     181 cctgttgtaa gctggcctgt gtagacacat ccctgttga gaaggtgata ttgcttgct  
     241 gtgtcttcat gcttcttc ccattctcca tcctctggc ctctatgct cgcattctag  
     301 ggactgtgct gcaaatgcac tctgtcagg cctggaaaaa ggcctggcc acctgctct  
     361 ccacctgac agctgtcacc ctctctatg ggcagccat gtcatctac ctgaggccta  
     421 ggcgctaccg ggccccagc catgacaagg tggccttat ctctacaca gtccttact  
     481 ccattgctg (SEQ ID NO:212).

## OR131

LOCUS AF179752 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO102) gene, partial cds.  
 ACCESSION AF179752  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Gorilla gorilla"  
         /db\_xref="taxon:9593"  
     gene <1..>487  
         /gene="GGO102"  
     CDS <1..>487  
         /gene="GGO102"  
         /codon\_start=2

/product="olfactory receptor"  
 /translation="VVICHPLHYTVIMREEFCVFLVAVSWILSCASSLSHTVLLTQLS  
 FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMCILVSYGYIGATI  
 LGVPSTKGIHKALSTCGSHLSVVSLEYGSIFGQYLFPTVSSFIDKDVIVALMYTVVTP  
 5 TL" (SEQ ID NO:214).  
 BASE COUNT 87 a 137 c 106 g 157 t  
 ORIGIN  
 1 tgtgtcata tgtcacctc tccactacac tgtcatcatg agggaagagt tctgtgtctt  
 61 cttagtggct gtattcttga ttctgtcttg tgccagctcc ctctctcaca ccgttctcct  
 10 121 gaccacagtg tctttctgtg ctgcgaacac catcccccac gtcttctgtg acctgtctgc  
 181 cctgtctcaag ctgtcctgct cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
 241 ggtggtggc attacctgc cattcatgtg tatcctgcta tcatatggtt acattggggc  
 301 caccatcctg ggggtccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
 361 ccattctctc gtggtgtctc tctattatgg gtcaatatt ggccagtacc tttcccgac  
 15 421 tgtaagcagt ttattgaca aggatgtcat tgtggctctc atgtacacgg tggcacacc  
 481 cacgttg (SEQ ID NO:213).

### OR132

20 LOCUS AF179753 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla GGO103 pseudogene, partial sequence.  
 ACCESSION AF179753  
 KEYWORDS .  
 SOURCE gorilla.  
 25 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 40 source 1..488  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>488  
 /gene="GGO103"  
 /pseudo  
 45 BASE COUNT 86 a 149 c 108 g 145 t  
 ORIGIN  
 1 tgcggctgtc tgccaccac tccgatatcc cactctcatg agctggcagc tgtgcctgag  
 61 gataaacatg ttgtcttggc tcctgggtgc agctgacggg ctcatgcagg ctgttgctac  
 121 cctgagcttc ccatattgcg gtgcacacga gatcatcac ttctctgcg aggcccccgt  
 181 gctggttcat ttgcttgtg ctgacacttc agtcttcgaa aagccatgt acatctgctg  
 241 tgtgtaatg ctctgtgctc cttttccct catcctgtcc tctatggc tcacctctgc  
 301 tgcgttctg cacatgcgct ctacagaagc ccgcaagaag gccttgcca cctgtcttc  
 361 acatttggtc gtggtgggac tctttatgg agctgccatt ttacctata tgagaccaa  
 421 atcccacagg tccactaacc acgataaggt tgtgtcagcc ttctatagta tgttaccacc  
 55 481 ttactaa (SEQ ID NO:215).

### OR133

5 LOCUS AF179754 458 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla GGO104 pseudogene, partial sequence.  
ACCESSION AF179754  
KEYWORDS .  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..458  
/organism="Gorilla gorilla"  
25 /db\_xref="taxon:9593"  
gene <1..>458  
/gene="GGO104"  
/pseudo  
BASE COUNT 89 a 139 c 88 g 142 t  
30 ORIGIN  
1 ccaccatcat gagtcacagc cagtggtgca tgctgggtggc tgggtcctgg gtcacgctt  
61 gtgcgtgtgc tcttttgcac accctcctcc tggcccggct ttcctctgt gctgaccaca  
121 tcacccctca cttctctgt gaccttggtg ccctgctcaa gttgtcctgc tcagacacct  
181 ccctcaatca gtagcaatc ttacagcag gattgacagc cattatgctt ccattcctgt  
35 241 gcatcctggt ttctatggt cacattgggg tcaccatcct ccagattccc tctaccaagg  
301 gcatatgcaa agccttgctc acttggtgat cccacctctc agtgggtgact atctattatg  
361 ggacaattat tggctctat ttcttcccc catcctgcaa caccaatgac gagaacataa  
421 ttgcttcagt gatatacaca gtagtcactc ccatattg (SEQ ID NO:216).

### OR134

40 LOCUS AF179755 477 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO106) gene, partial cds.  
ACCESSION AF179755  
45 KEYWORDS .  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
50 REFERENCE 1 (bases 1 to 477)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
55 REFERENCE 2 (bases 1 to 477)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers  
 source 1..477  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 10 gene <1..>477  
 /gene="GGO106"  
 CDS <1..>477  
 /gene="GGO106"  
 /codon\_start=2  
 /product="olfactory receptor"  
 15 /translation="VAIRKPLHYLVIMRQWVCVVLLVMSWVGGFLHSVFQLSIIYGLP  
 FCGPNVIDHFFCDMYPLLKLVCTDTHVIGLLVVTNGGLSCTIVFLLLLISYGVILHSL  
 KKLSQKGRQKALSTCSSHITVVVFFVPCIFMYARPARSPIDKSVSVFYTVITPML"  
 (SEQ ID NO:218).

20 BASE COUNT 100 a 108 c 100 g 169 t  
 ORIGIN  
 1 tgtggccatc cgttaagccct tgcattattt ggttatcatg agacaatggg tgtgtgtgtg  
 61 gctgctggta atgtcctggg ttggaggatt tctgcactca gtattcaac ttagcattat  
 121 ttatgggctc ccattctgtg gccccaatgt cattgatcac ttttctgtg acatgtatcc  
 181 cttattgaaa ctggtctgca ctgacacca tgttattggc ctcttagtgg tgaccaatgg  
 25 241 aggactgtct tgcactattg tgtttctgct cttactcatc tcttatgggt tcatcttgca  
 301 ctctctaaag aaacttagtc agaaagggag gcaaaaagcc ctctcaacct gcagttccca  
 361 catcactgtg gttgtctct tctttgttcc ttgtatttt atgtatgcta gacctgctag  
 421 gagcttcccc attgacaaat cagtgagtgt gttttataca gtcataaccc caatgct (SEQ ID NO:217).

30 **OR135**

LOCUS AF179756 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO107) gene, partial cds.  
 35 ACCESSION AF179756  
 KEYWORDS .  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

40 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers  
 source 1..488  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 55 gene <1..>488  
 /gene="GGO107"



CDS <1..>488  
 /gene="GGO107"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LAICYPLHYGAMMSSLLSVQLALGWSVCGFMAIAVPTALISGLS  
 FCGPRAINHHFFCDIAPWIALACTNTQAVELVAFVIAVVVILSSCLITLVSYYIISTI  
 LRIPSASGRSKAFSTCSSHLTVVLIWYGSTIFLHVRTSIKDALDLIKAVHVLNTVVTP  
 VL" (SEQ ID NO:220).  
 BASE COUNT 84 a 155 c 108 g 141 t  
 ORIGIN  
 1 ttctgccatc tgctatcctt tacactacgg agccatgatg agtagcctgc tctcagtgc  
 61 gttggccctg ggctcctggg ttgtggtt catggccatt gcagtgccca cagccctcat  
 121 cagtggcctg tccttctgtg gccccctgc catcaaccac ttcttctgtg acattgcacc  
 181 ctggattgcc ctggcctgca ccaacacaca ggcaatagag ctgtggcct ttgtattgc  
 241 ttgtgtggtt atcctgagtt catgcctcat caccctgtc tcctatgtgt acatcatcag  
 301 caccatcctc aggatccct ctgccagtgg ccggagcaaa gccttctcca cgtgctcctc  
 361 gcattcacc gtggtgctca ttggtatgg gtccacaatt ttcttcacg tccgcacctc  
 421 tatcaaagac gccttgatc tgaatcaagc tgccacgtc ctgaacactg tggtagctcc  
 481 agttttaa (SEQ ID NO:219).  
**OR136**  
 LOCUS AF179757 480 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla GGO108 pseudogene, partial sequence.  
 ACCESSION AF179757  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..480  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>480  
 /gene="GGO108"  
 /pseudo  
 BASE COUNT 95 a 125 c 101 g 159 t  
 ORIGIN  
 1 tgtggcgtg tgtaaccctc ttctctacac agttgcaatg tccagaggc ttgtcctt  
 61 gttgtggct acatcatact gttgggggac agtctgttcc ctgacacctt ctttctactg  
 121 gaattatcct tcagaggaaa taatatcatt aataactttg tctgtgagca cgctgtcatt  
 181 gttgctgtgt ctgtctctga cccctatttg agccaggaga tcactttagt ttctgccaac  
 241 attcaatgaa ataagcagcc tggatgatc tctcacttcc tatgctttca tttttatcac  
 301 tgtcatgaag acgccttcca ctggggggcg caagaaagcg ttctccactg gtgcctccca

361 cttgacggcc attaccattt tccatgggac tatccttttc ctctactgtg ttctaactc  
 421 aagttcgcgg ctcatgtgca aggtggcctc tgcctttgac acagtgggtc ttcccatgtg (SEQ ID NO:221).

## OR137

5 LOCUS AF179758 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO109) gene, partial cds.  
 ACCESSION AF179758  
 KEYWORDS .  
 10 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 15 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 20 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 25 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>487  
 /gene="GGO109"  
 30 CDS <1..>487  
 /gene="GGO109"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYATIMSHSQCVMLVAGSWVIACACALLHTLLRLS  
 35 FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
 LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPSSNTNDKNIIASVIYTVVTP  
 ML" (SEQ ID NO:223).  
 BASE COUNT 95 a 148 c 93 g 151 t  
 ORIGIN  
 40 1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcacagcc agtgtgtcat  
 61 gctgggtggc gggtcctggg tcatcgctg tgcgtgtgct ctttgcata ccctcctct  
 121 ggcccggtt tcttctgtg ctgaccacat catcctcac ttctctgtg accttgggtc  
 181 cctgctcaag ttgtctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg  
 241 attgacagcc attatgctc cattctgtg catcctggtt tcttatggtc acattggggt  
 45 301 caccatctc cagattcct ctaccaaggc catatgcaa gcctgtcca cttgtggatc  
 361 ccaccttca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctcccc  
 421 atccagcaac accaatgaca agaacataat tgcttcagt atatacacag tagtcactcc  
 481 catgttg (SEQ ID NO:222).

## OR138

50 LOCUS AF179759 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA1) gene, partial cds.  
 ACCESSION AF179759  
 55 KEYWORDS .

SOURCE human.  
 ORGANISM Homo sapiens  
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
           Eutheria; Primates; Catarrhini; Hominidae; Homo.

5 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
       Evidence for reduction of function in primates  
 JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
       1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

15 FEATURES       Location/Qualifiers  
   source       1..487  
               /organism="Homo sapiens"  
               /db\_xref="taxon:9606"  
   gene         <1..>487  
               /gene="HSA1"  
   CDS         <1..>487  
               /gene="HSA1"  
               /codon\_start=2  
               /product="olfactory receptor"  
               /translation="VAICNPLLYPVMMSNKLSAQLLSISYVIGFLHPLVHVSLLLRLT  
               FCRFNIIHYFYCEILQLFKISCNGPSINALIIFGAFIQIPTLMTIIISYTRVLFDI  
               LKKKSEKGRSKAFSTCGAHLHSVSLYYGTLIFMYVRPASGLAEDQDKVYSLFYTHIIP  
               LL" (SEQ ID NO:225).

25 BASE COUNT   131 a   105 c   77 g   174 t

30 ORIGIN  
       1 tgtagccata tgtaatccct tgctttatcc agtgatgatg tccaacaaac tcagcgctca  
       61 gttgctaagt attcatatg taattggttt cctgcatcct ctgggtcatg tgagtttact  
       121 attgcgacta actttctgca ggttaacat aatacattat ttctactgtg aaattttaca  
       181 actgttcaaa atttcatgca atggtccatc tattaacgca ctaataatat ttatttttgg  
       241 tgcttttata caaataccca ctttaatgac tatcataatc tcttatactc gtgtgctctt  
       301 tgatattctg aaaaaaaagt ctgaaaaggg cagaagcaaa gccttctcca catgcggcgc  
       361 ccatctgctt tctgtctcat tgtactacgg aactctgac ttcatgtatg tgcgtcctgc  
       421 atctggctta gctgaagacc aagacaaagt gtattctctg ttttacacga ttataattcc  
       481 cctgcta (SEQ ID NO:224).

# **OR139**

LOCUS AF179760 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA10) gene, partial cds.

45 ACCESSION AF179760  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
           Eutheria; Primates; Catarrhini; Hominidae; Homo.

50 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
       Evidence for reduction of function in primates

55 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Homo sapiens"  
         /db\_xref="taxon:9606"  
     gene <1..>487  
         /gene="HSA10"  
     CDS <1..>487  
         /gene="HSA10"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICHPLHYTVIMREELCVFLVAVSRILSCASSLSHTLLLTRLS  
         FCAANTVPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMFCILVSYGYIGATI  
         LRVPSTKGIHKALSTCGSHLSVVSLLYYGSIFGQYLFPTVSSSIDKDIVALMYTVDTP  
         ML" (SEQ ID NO:227).  
 BASE COUNT 87 a 142 c 106 g 152 t  
 ORIGIN  
     1 ttgtgccata tgcaccctc tccactacac tgtcatcatg agggagagac tctgtgtctt  
     61 cttagtgct gtatctcgga ttctgtcttg tgccagctcc ctctctcaca ccctctcct  
     121 gaccggctg tctttctgtg ctgcgaacac cgtcccccat gtcttctgtg accttgctgc  
     181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggcatgtg tcacagtagg  
     241 ggtggtggtc attacctgc cattcatgtg tatectggtg tcatatggct acattggggc  
     301 caccatctg agggctcctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
     361 ccattctctc gtggtgtctc tctattatgg gtcaatatt ggccagtacc ttttcccgac  
     421 tgtaagcagt tctattgaca aggatgtcat tgtggctctc atgtacacgg tggacacacc  
     481 catgttg (SEQ ID NO:226).

## OR140

LOCUS AF179761 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA12) gene, partial cds.  
 ACCESSION AF179761  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Homo sapiens"  
         /db\_xref="taxon:9606"

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gene      <1..>487
          /gene="HSA12"
CDS       <1..>487
          /gene="HSA12"
          /codon_start=2
          /product="olfactory receptor"
          /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC
          FCADNVIPHFFCDMSALLKLAFSDTRVNEWVIFIMGGLILVIPFLILGSYARIVSSI
          LKVPSSKGICKALSTCGSHLSVVSIFYGTVIGLYLCSSANSSTLKDTVMAMMYTVVTP
10         ML" (SEQ ID NO:229).
BASE COUNT   85 a  141 c  103 g  158 t
ORIGIN
      1 tgtggccatc tgcttcccc tgcactacac cgcccatcatg agcccccatgc tctgtctcgc
      61 cctgggtggcg ctgtcctggg tgctgaccac ctcccatgcc atgttacaca ctttactcat
15     121 ggccagggtg tgttttgg cagacaatgt gatccccac ttttctgtg atatgtctgc
      181 tctgctgaag ctggccttct ctgacactcg agttaatgaa tgggtgatat ttatcatggg
      241 agggctcatt ctgtcatcc catctctact catcctggg tcctatgcaa gaattgtctc
      301 ctccatcctc aagggtccctt ctctaaggg tatctgcaag gcctctcta ctgtggctc
      361 ccacctgtct gtggtgtcac tgttctatgg aaccgttatt ggtctctact tatgctcatc
20     421 agctaatatg tctactctaa aggacactgt catggctatg atgtacactg tggtgacccc
      481 catgctg (SEQ ID NO:228).

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#### OR141

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25     LOCUS   AF179762  486 bp  DNA      PRI    31-DEC-2000
      DEFINITION Homo sapiens HSA13 pseudogene, partial sequence.
      ACCESSION  AF179762
      KEYWORDS   .
      SOURCE     human.
30     ORGANISM Homo sapiens
          Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
          Eutheria; Primates; Catarrhini; Hominidae; Homo.
      REFERENCE  1 (bases 1 to 486)
          AUTHORS Giorgi,D.G. and Rouquier,S.P.
35     TITLE    The olfactory receptor gene repertoire in primates and mouse:
          Evidence for reduction of function in primates
          JOURNAL  Unpublished
      REFERENCE  2 (bases 1 to 486)
          AUTHORS Giorgi,D.G. and Rouquier,S.P.
40     TITLE    Direct Submission
          JOURNAL  Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
          1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
      FEATURES   Location/Qualifiers
          source   1..486
45           /organism="Homo sapiens"
          /db_xref="taxon:9606"
          gene     <1..>486
          /gene="HSA13"
          /pseudo
50     BASE COUNT   108 a  139 c   96 g  143 t
      ORIGIN
          1 cgtggctgtg tgtaaccccc tctctatgc catagtcatg acaccaatga cccgcctggc
          61 gctgctggcc ggggcatatt ctgggtccat agtcaattct gtgatctgca ctggctgcac
          121 ctctctatc tccttctcta agtccaacca thtagacttc ttttctgtg acctccacc
55     181 cctgctgaag ctgcctgta gtgaaaccag gccacgggaa tgggtgatct acctctcagc

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241 tttctggctc atcacacca gcatttcagt gattcttaca tegtactgt tcatcattca  
 301 gctattcttg aagattcgta cagcagggtgg aaagccaaga ccttctccac ctgtgcttct  
 361 cacaagactg cattgactct ctcttttga acatcatat tcatatacct gaaaggcaac  
 421 atgggcgaat cccttgagga agacaagatc gtgtcaatat tttaactgt ggtcatcccc  
 5 481 atgcta (SEQ ID NO:230).

## OR142

LOCUS AF179763 487 bp DNA PRI 31-DEC-2000  
 10 DEFINITION Homo sapiens HSA16 pseudogene, partial sequence.  
 ACCESSION AF179763  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 20 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Homo sapiens"  
 30 /db\_xref="taxon:9606"  
 gene <1..>487  
 /gene="HSA16"  
 /pseudo  
 BASE COUNT 111 a 110 c 96 g 170 t  
 35 ORIGIN  
 1 catggccatt gtgaaccctt tactttatac agtagctatg actaaaatag ttgtattgt  
 61 gctcgcatth gggatcatga tgggagggtt aatcagctca ttgacacata caattggctt  
 121 ggtgaaactg tctttctgtg ggccaaatgt catcagtcac ttcttctgtg atcttccccc  
 181 actgttgaa gctgtcatgt ctgagacatc tatgaatgaa ttgttgcttt tgatcttctc  
 40 241 tggcattatt gccacgctca ctttttgac tgtggtgatc tctacatct tcattgttgc  
 301 tgctatcctg aggatccgct aagaagcagg tagacgtaaa gccttctcca cctgcacctc  
 361 tcacctgatt accgtgacct tattctatgg atcgataagc tttagttaca ttcagccaaa  
 421 ctcccagtat tccctagaac aagaaaaggt ggtgtctgta tttataccc tgggtgttcc  
 481 tatgtta (SEQ ID NO:231).  
 45

## OR143

LOCUS AF179764 485 bp DNA PRI 31-DEC-2000  
 50 DEFINITION Homo sapiens HSA18 pseudogene, partial sequence.  
 ACCESSION AF179764  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 55 Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 5 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..485  
 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 15 gene <1..>485  
 /gene="HSA18"  
 /pseudo  
 BASE COUNT 90 a 116 c 106 g 173 t  
 ORIGIN  
 20 1 cgtgggcac tgtaaccac tgggtacac ggtcaccatg tctcccaga agtgtttgct  
 61 cctttactg ggtgtctatg ggatggggat ttggggctg tggctcatat gggaaacata  
 121 atgtttatgt cttttgtgg agacaacctt gtcaatcact atatgtgtga catccttcct  
 181 ctccctgagc tctcctgcaa cagctcttac ataaatttgc tggtggtttt tattattgtg  
 241 accgttggca ttgggggtgcc gattgtcacc atttttctct cttatgggtt tattctttcc  
 25 301 agcatttccc acattagtgc cacagagggc aggtctaaag ccttcagtac ctgcagttcc  
 361 cacataattg tggatcgct ttcttgggt caggtgcttt catgtacctc aaaccacctt  
 421 ctattctacc cctggaccag gggaaagtgt cctccatttt ttgtactgct gtggtgccca  
 481 tgttt (SEQ ID NO:232).  
 30 **OR144**  
 LOCUS AF179765 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA2 pseudogene, partial sequence.  
 ACCESSION AF179765  
 35 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 40 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 45 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 50 FEATURES Location/Qualifiers  
 source 1..486  
 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>486  
 55 /gene="HSA2"

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/pseudo
BASE COUNT  88 a  117 c  107 g  174 t
ORIGIN
    1 cgtgggcac tgtaaccac tgggtacac ggtcacatg tctcccaga tgtgttgct
5   61 cctttactg ggtgtctatg ggggtgggat tttgggctg tggctcatat gggaaacata
    121 atgtttatgt cctttgtgg agacaacctt gtcaatcact atatgtgtga catccttcct
    181 ctccctgagc cctcctgcaa cagctcttac ataaattgc tgggtgttt tattattgtg
    241 accgttgga tgggggtgcc gattgcacc attttctct cttatgttt tattcttcc
10  301 agcatttcc acattagttc cacagagggc aggtctaaag ccttcagtac ctgcagttcc
    361 cacataattg tggatcgct tttcttggg tcagggtctt tcatgtacct caaaccacct
    421 tctattctac ccttggaaca ggggaaagtg tctccattt ttgtactgc tgtggtgccc
    481 atgttt (SEQ ID NO:233).

OR145
15  LOCUS  AF179766  487 bp  DNA      PRI    31-DEC-2000
    DEFINITION  Homo sapiens olfactory receptor (HSA3) gene, partial cds.
    ACCESSION  AF179766
    KEYWORDS   .
20  SOURCE   human.
    ORGANISM  Homo sapiens
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Catarrhini; Hominidae; Homo.
    REFERENCE  1 (bases 1 to 487)
25  AUTHORS  Giorgi,D.G. and Rouquier,S.P.
    TITLE     The olfactory receptor gene repertoire in primates and mouse:
            Evidence for reduction of function in primates
    JOURNAL   Unpublished
    REFERENCE  2 (bases 1 to 487)
30  AUTHORS  Giorgi,D.G. and Rouquier,S.P.
    TITLE     Direct Submission
    JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
            1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
    FEATURES   Location/Qualifiers
35  source    1..487
            /organism="Homo sapiens"
            /db_xref="taxon:9606"
    gene       <1..>487
            /gene="HSA3"
40  CDS       <1..>487
            /gene="HSA3"
            /codon_start=2
            /product="olfactory receptor"
            /translation="VAICKPLHYVVMNNRVCTLLVLCCWVAGLMIIVPPLSLGLQLE
45  FCDSNAIDHFSCDAGPLLKISCSDTWVIEQMVILMAVFALIITPVCVILSYLYIVRTI
            LKFPSVQQRKKAFTSCSSHMIVVSIAYGSCIFIYIKPSAKDEVAINKGVSVLTTSVAP
            LL" (SEQ ID NO:235).
    BASE COUNT  114 a  113 c  97 g  163 t
    ORIGIN
50  1 tgtggccac tgtaacccc ttcattatgt ggtcatcatg aacaacaggg tgtgtacct
    61 attagttctc tgctgtggg tggctggctt gatgatcatt gtccaccac ttagcttagg
    121 cctccagctc gaattctgtg actccaatgc cattgatcat ttagctgtg atgcaggtcc
    181 tctcctaag atctcatgct cagatacatg ggtaatagaa cagatggta tacttatggc
    241 tgtatttga ctattatca cccagtttg tgtgattctg tcctactgt acatagtcag
55  301 aacaattctg aagttccctt ctgttcagca aaggaaaaag gcctttcta cctgttcac

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361 ccacatgatt gtggtttcca ttgcctatgg aagctgcatc ttcatctata tcaagccctc  
 421 tgcaaaagat gaggtggcca taaataaagg agtttcagtt ctactactt ctgtcgacc  
 481 ctgttg (SEQ ID NO:234).

## 5 OR146

LOCUS AF179767 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA5) gene, partial cds.  
 ACCESSION AF179767  
 10 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 15 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 20 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 25 FEATURES Location/Qualifiers  
 source 1..487  
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 /db\_xref="taxon:9606"  
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 30 /gene="HSA5"  
 CDS <1..>487  
 /gene="HSA5"  
 /codon\_start=2  
 /product="olfactory receptor"  
 35 /translation="VAICHPLHYTVIMREELCVFLVAVTWILSCASSLSHTLLLRLS  
 FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
 LRPVSTKGIHKALSTCGSHLSVVSLLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP  
 ML" (SEQ ID NO:237).  
 BASE COUNT 88 a 141 c 105 g 153 t  
 40 ORIGIN  
 1 tgttgccata tgtcacccctc tccactacac tgtcatcatg aggggaagagc tctgtgtctt  
 61 cttagtggtc gtaacttgga ttctgtcttg tgccagctcc ctctctcaca cccttctcct  
 121 gacccggctg tctttctgtg ctgcgaacac catcccccat gtcttctgtg accttctctc  
 181 cctgtctcaag ctgtctctgt cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
 45 241 ggtggtggtc attaccctgc cattcatgtg tctctggta tcatatggct acattggggc  
 301 caccatcctg aggggtccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
 361 ccattctctc gtggtgtctc tctattatgg gtcaatattt ggccagtacc ttccccgac  
 421 tgtaagcagt tctattgaca aggatgtcat tgtggctctc atgtacacgg tggtcacacc  
 481 catgttg (SEQ ID NO:236).

## 50 OR147

LOCUS AF179768 478 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA6 pseudogene, partial sequence.  
 55 ACCESSION AF179768

KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 5      Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 10 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 15      1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..478  
         /organism="Homo sapiens"  
         /db\_xref="taxon:9606"  
 20      gene <1..>478  
         /gene="HSA6"  
         /pseudo  
 BASE COUNT 89 a 128 c 103 g 158 t  
 ORIGIN  
 25      1 tgttgccatc tgtaaccctt tgcgctacct tacagtcatg aacccccagc tatgcctttg  
     61 gttgtgttct gctgctggt gtgggggttt tatccactct atcatgcagg tcatactagt  
     121 catccagctg cctttctgtg ggcccaatga actggacaac ttctactgtg atgtctaca  
     181 aatcatcaag ctggcctgca tggacaccta tgtgtagag gtgctggtga tagccaacag  
     241 tggctctgtg tctctgtct gcttctggt ctactattc tcttatgcta tcactctgat  
 30      301 caccctgaga acacgcttct gccagggcca gaacaaggtc ctctctacct gtgcttctca  
     361 cctgacagtg gtcagcctga tctcgtgcc atgcgtattc atctatttga ggcctttctg  
     421 cagcttctct gtggataaga tattctcctt gttttacaca gtgattacac ctatgttg (SEQ ID NO:238).

**OR148**  
 35 LOCUS AF179769 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA7 pseudogene, partial sequence.  
 ACCESSION AF179769  
 KEYWORDS .  
 40 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 488)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 55      source 1..488

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/organism="Homo sapiens"
/db_xref="taxon:9606"
gene <1..>488
/organism="HSA7"
/pseudo
5 BASE COUNT 95 a 141 c 103 g 149 t
ORIGIN
1 catggccatc tgcaagccct tgttatatgg aagcaaatg accagggtgtg tctgcctctg
61 tctggctgct gctccctata ttatggctt tgcaaatggt ctaagcacag accaccctga
10 121 tgcttcgtct gtccttctgt ggaccaatg acatcaacca cttttactgt gcggaccac
181 cctctctagt cctgcctgc tcagatactt atgtcaaaga gaccgccatg ttggtggtgg
241 ctgggtccaa cctcatttgc tctctaccg tcactctcat ttctacact ttcatctca
301 ctgccattct gcgtatccac actgctgagg ggaggcgcaa ggccttctcc acctgcgggt
361 ctcctgtgac cgctgtcact gtcttctatg ggacactgtt ctgcatgtac ctgaggcccc
15 421 cttctgagac atctatacaa caggggaaaa ttgtagctgt ttttatatc ttgtgagtc
481 cgatgtta (SEQ ID NO:239).

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## OR149

```

20 LOCUS AF179770 487 bp DNA PRI 31-DEC-2000
DEFINITION Homo sapiens olfactory receptor (HSA8) gene, partial cds.
ACCESSION AF179770
KEYWORDS .
SOURCE human.
25 ORGANISM Homo sapiens
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Hominidae; Homo.
REFERENCE 1 (bases 1 to 487)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
30 TITLE The olfactory receptor gene repertoire in primates and mouse:
Evidence for reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 487)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
35 TITLE Direct Submission
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
source 1..487
40 /organism="Homo sapiens"
/db_xref="taxon:9606"
gene <1..>487
/organism="HSA8"
CDS <1..>487
45 /organism="HSA8"
/codon_start=2
/product="olfactory receptor"
/translation="VAICKPLHYTSIMNRKLCTLLVLCAWLSGFLTIFPPLMLLLQLD
YCASNVIDHFACDYFPLLQLSCSDTWLLEVIGFYFALVTLFTLALVILSYMYIIRTI
50 LRIPSASQRKKAFSTCSSHMIVISISYGSCIFMYANPSAKEKASLTGKIAILNTSVAP
ML" (SEQ ID NO:241).
BASE COUNT 115 a 119 c 80 g 173 t
ORIGIN
1 tgttgccatc tgcaagcccc ttcatcac atccatcatg aacaggaac tctgcactct
55 61 actgtgtgctg tgtgcctggc taagtgggtt tctgaccatt ttccaccccc ttatgcttct

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121 cctccagctg gattactgtg cttccaacgt cattgatcac ttgcatgtg actattttcc  
 181 cctcttaaa ctatctgtt cagatacatg gctcctagaa gtaattggtt ttactttgc  
 241 ttggttact ttgctgttca ctttggcatt agtgatttta tcttacatgt acattatcag  
 301 gaccattttg agaatcccg tggccagtca aagaaaaaag gcttttcca cttgttctc  
 5 361 tcacatgatt gtcatttcca ttcttatgg aagctgtata ttcattgatg ctaatccatc  
 421 tgcaaaagaa aaggcatcat tgacaaaagg aatagctatt ctcaatacat ctgtgcccc  
 481 catgctg (SEQ ID NO:240).

## OR150

10 LOCUS AF179771 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU145) gene, partial cds.  
 ACCESSION AF179771  
 KEYWORDS .  
 15 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 485)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 485)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..485  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>485  
 /gene="EFU145"  
 35 CDS <1..>485  
 /gene="EFU145"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICQPLQYSTAMSHQLCALMLAMCWLLTNCPALMHTLLLTRVA  
 40 FCAQRAIPHFYCDPSALLKLACSDTRINELMIAMGLAFLTVPLTLIVFSYVRISWAV  
 LGISSPGGRCKAFSTCGSHLTVVLLFYGSLMGVYLLPPSSYSTERESRAAILYMVIIP  
 M" (SEQ ID NO:243).  
 BASE COUNT 78 a 155 c 114 g 138 t  
 ORIGIN  
 45 1 tgtggccatc tgccagccac tccaatacag cacagctatg agtcaccagc tctgtgcact  
 61 catgctggcc atgtgctggc tgctaacaa ctgtcctgca ttgatgcaca cgctgttgc  
 121 gaccctgtgt gctttctgtg cccagagggc catcccccac tctactgtg atccagtg  
 181 tctcctgaag ctgcctgct cggatacccg cataaacgag ctgatgatca tcgcatggg  
 241 ctggccttc ctcacggtc ccctcacgct gatcgttctc tctacgtcc gcattctcct  
 50 301 ggctgtgctt ggcattctgt ctctggagg gogatgcaa gccttctcca cctgtgggtc  
 361 tcattctcag gtgttctgc tctctatgg gtctctatg ggtgtgatt tgcttctcc  
 421 gtcattctac tctacagaga gggaagcag ggctgccatt ctctacatgg tgatcattcc  
 481 catgt (SEQ ID NO:242).

## 55 OR151

LOCUS AF179772 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus EFU146 pseudogene, partial sequence.  
 ACCESSION AF179772  
 5 KEYWORDS  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 10 REFERENCE 1 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 15 REFERENCE 2 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 20 FEATURES Location/Qualifiers  
 source 1..485  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>485  
 25 /gene="EFU146"  
 /pseudo  
 BASE COUNT 98 a 145 c 110 g 132 t  
 ORIGIN  
 1 cgttgccatc tgcaagcccc tccactaccc ggtgctcatg agcagcaggg tctgcacaca  
 30 61 gctcatcctc gctgctggc tggcagggtt ctccttcac attgtgctg tcatcctgac  
 121 cagtcagctt ccattctgtg acaccacat caaccactt tctgtgact atacctct  
 181 aatggagggt gctgcagtg ggccaaaggt gctggagatg gtggatttta cctggcctt  
 241 ggtggcaccg ctcagcacct tgggtgctgat caccctgtcc tacatccaga tcatcagcac  
 301 gattgtcagg atcccctctg tccaggagag gaaaaaggct ttctccacct gttcctccca  
 35 361 tgcacgtg gttaccatgt gctatggaaa gctgttttt tatgtatgc aagccctccc  
 421 caggcaaaagg ggttgatcta aacaaaggag tgtctctaat caatacagtt attgcccccc  
 481 tcttg (SEQ ID NO:244).

## OR152

40 LOCUS AF179773 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU147) gene, partial cds.  
 ACCESSION AF179773  
 KEYWORDS  
 45 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5 source 1..487  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>487  
 /gene="EFU147"  
 10 CDS <1..>487  
 /gene="EFU147"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICLPLHYTMVMKPRCCLMLVAASWLC SHCLAFSLTLLMTQFS  
 15 FCASHSIQHFFCDVPPLLKLACSDTHIFQVTMLTEGVLSGVIPLTCVLSYAHIMHTI  
 LRIPSAGGKHKVFSTCGSHLSVVTFLFYGTLFLVYFQPSSSYSADTGMVACVVYTMVTP  
 MV" (SEQ ID NO:246).  
 BASE COUNT 86 a 161 c 93 g 147 t  
 ORIGIN  
 20 1 cgtggccatc tgccttcctc tgcactacac catggtcatg aaaccccgat gctgectgat  
 61 gctggtggca gcatcctggc tctgctccca ctgcctggct ttctctctca cccttctgat  
 121 gactcagttc tcattctgtg cctcccatc catccaacac ttttctgtg atgtaccccc  
 181 actcctcaaa ctgcctggt cagacacca tatcttcag gtcacaatgt taactgaagg  
 241 agtctctca ggtgtgatcc ctctacctg tgcctgggc tcttatgccc acatcatgca  
 25 301 caccatcctc aggatccctt ctgctggggg caagcacaaa gtcttctcta cctgtggctc  
 361 tcacctgtca gtggtcactc tcttctatgg gacctcttt ctggtgtatt tcagccttc  
 421 atcctcctac tcagcagata ctggaatggt ggcattgtga gtatacacga tggtcacccc  
 481 catggtg (SEQ ID NO:245).  
 30 **OR153**  
 LOCUS AF179774 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU148) gene, partial cds.  
 ACCESSION AF179774  
 35 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 40 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 45 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 50 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Eulemur fulvus"  
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 gene <1..>487  
 55 /gene="EFU148"

CDS <1..>487  
 /gene="EFU148"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYVAIMSNTVCRRLLVFCCWVAGLFIIIPPLSLGLNLE  
 5 FCDSDTIDHFICDASPLLNISCNTWFMEQTVIICAVLTLIMTLMCVVLSYIYIIKTI  
 LGFSSAQKKKAFSTCSSHMIVVSITYGSYIFIYIKPSAKEEVAINKGVTVLTTSIAP  
 ML" (SEQ ID NO:248).  
 BASE COUNT 118 a 118 c 88 g 163 t  
 10 ORIGIN  
 1 tgtggccatc tgcaaacgc tgcattatgt ggccattatg agtaacacag tctgcagaag  
 61 acttgtcttt tgttgtggg tagctggtct gttattata atccctccac ttagcctggg  
 121 cctaaatctg gaattttgtg attctgatac cattgatcat ttatctgtg atgcatctcc  
 181 cctcctgaat atctcttgtt caaatacttg gttcatggaa cagactgta tcatctgtgc  
 15 241 agtgctgacc ctcatatga cacttatgtg tgtagttctg tcctacattt atatcatcaa  
 301 gacaatttta ggattctctt ctgcccagca aaagaaaaaa gccittcca cctgttcttc  
 361 ccacatgatt gtggtgtcca tcacctatgg cagctacatc ttcatctata tcaaaccttc  
 421 tgcaaaggaa gaagtagcca ttaacaaggg tgtgacagtc ctactactt ccategcccc  
 481 catgctg (SEQ ID NO:247).  
 20  
**OR154**  
 LOCUS AF179775 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU149) gene, partial cds.  
 25 ACCESSION AF179775  
 KEYWORDS  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 40 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 45 gene <1..>487  
 /gene="EFU149"  
 CDS <1..>487  
 /gene="EFU149"  
 /codon\_start=2  
 50 /product="olfactory receptor"  
 /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSFLIVFPALMLLLKLD  
 YCGFNIIDHFTCDYFLLQLSCSDTKFLEIMGFSCAVFTLMFTLALIFLSYMHIVRTI  
 LRIPSTSQRTKAFSTCSSHMIVVISYGSICIFMYIKPSAKDRVSLSKAVAVLITSVAP  
 ML" (SEQ ID NO:250).  
 55 BASE COUNT 109 a 113 c 91 g 174 t

#### ORIGIN

1 tgttgctatc tgtaagcccc tgcattacag ggatcatcatg aatcgaagag tctgcacact  
61 gctcgtcttt gcctcttggc tggtttcatt ctaaatcgta ttcccagcac tcatgttgct  
121 cttaaagctt gattactgtg gatttaatat tatgacccat ttacctgtg attattttcc  
5 181 cctgctgcag ctttctgtt cagatacaaa attcctggag ataatggggt tttcctgtgc  
241 tgtgtttact ctaatgttca ctttggcatt aatatttctg tctacatgc acatcgtgag  
301 aacgattttg agaattcctt ctactagtca gaggacaaaag gccttttcta catgttcttc  
361 ccacatgatt gtcatttcca tctctatgg cagctgcatt tttatgtaca ttaagccctc  
421 agcaaaggat agagtatctt tgagcaaggc agtggtgtg ctaatcacct cagtagctcc  
10 481 catgctc (SEQ ID NO:249).

#### OR155

LOCUS AF179776 484 bp DNA PRI 31-DEC-2000  
15 DEFINITION Eulemur fulvus EFU150 pseudogene, partial sequence.  
ACCESSION AF179776  
KEYWORDS .  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
25 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
30 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
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35 /db\_xref="taxon:13515"  
gene <1..>484  
/gene="EFU150"  
/pseudo  
BASE COUNT 80 a 157 c 112 g 135 t  
40 ORIGIN

1 tctggctatc tgctatcctc tacactacgg gacaatcatg agcagcctgc tggctgcaca  
61 gctggccttg ggctcctggg tctgtggtt cctggccatt gcagtgtga cgcccttat  
121 cagtggcctg tcttctgtg gcgcccgtgc catcaatcac ttcttctgtg acattgcacc  
181 ctggatgcc ctggcctgta ccagcacaca ggcaatagag ctctggcct ttgtgattgc  
45 241 tttgtgttc atctgagtt catgctcat caccctgtgc tctacgtgt acattatcag  
301 caccatcctc aggatcccat ctgccagcgg cggagcaaaag cttctctac gtgctcctct  
361 cacctaccg tgggtgctcat ctggtatggg tccacgattt ttcttcatgt ccgcacctcc  
421 atcacagacg ccttggtatc gaccaaagct gtccatgtcc tgaacaccgt ggtgactcca  
50 481 gttc (SEQ ID NO:251).

#### OR156

LOCUS AF179777 487 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU151) gene, partial cds.  
55 ACCESSION AF179777



KEYWORDS .  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
/organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
20 gene <1..>487  
/gene="EFU151"  
CDS <1..>487  
/gene="EFU151"  
/codon\_start=2  
25 /product="olfactory receptor"  
/translation="LAICYPLHYRTIMSSLLATQLALGSWVCGFLAIAVLTALISGLS  
FCGARAINHFFCDIAPWIALACTSTQAIELVAFVIAFVVILSSCLITLVSYVYIIST  
LRIPSASGRSKAFSTCSSHLTVVLIWYGSTIFLHVRTSITDALDLTKAVHVLNTVVTP  
VL" (SEQ ID NO:253).  
30 BASE COUNT 83 a 159 c 110 g 135 t

ORIGIN  
1 tctggctatc tgctatcctc tacactacag gacaatcatg agcagcctgc tggctacaca  
61 gctggccttg ggctcctggg tctgtggttt cctggccatt gcagtgtga cggcccttat  
121 cagtggcctg tcttctgtg gcgcccgtgc catcaaccac ttctctgtg acattgcacc  
35 181 ctggattgcc ctggcctgca ccagcacaca ggcaatagag ctcgtggcct ttgtattgc  
241 ttttgggtc atctgagtt catgcctcat caccctggtc tctacgtgt acattatcag  
301 caccatcctc aggatcccat ctgccagcgg cggagcaaa gccttctcta cgtgctcctc  
361 tcacctcacc gtggtgtca tctggtatgg gtccacgatt ttttctcatg tccgcacctc  
421 catcacagac gccttggatc tgaccaaagc tgtccatgtc ctgaacaccg tggtgactcc  
40 481 agttcta (SEQ ID NO:252).

## OR157

LOCUS AF179778 487 bp DNA PRI 31-DEC-2000  
45 DEFINITION Eulemur fulvus olfactory receptor (EFU153) gene, partial cds.  
ACCESSION AF179778  
KEYWORDS .  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
55 Evidence for reduction of function in primates

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
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 gene <1..>487  
 /gene="EFU153"  
 CDS <1..>487  
 /gene="EFU153"  
 15 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSFLIVFPALMLLLKLD  
 YCGFNIIDHFTCDYFPLLQLSCSDTKFLEIMGFSCAVFTLMFTLALIFLSYMHIVRTI  
 LRIPSTSQRTKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLSKAVAVLITSVAP  
 20 ML" (SEQ ID NO:255).  
 BASE COUNT 109 a 113 c 91 g 174 t  
 ORIGIN  
 1 tgttgctatc tgtaagcccc tgcattacag ggatcatcatg aatcgaagag tctgcacact  
 61 gctcgtcttt gcctcttggc tggtttcatt cttaatcgta ttcccagcac tcatgttgct  
 25 121 cttaaagcct gattactgtg gatttaatat tattgacat ttacctgtg attattttcc  
 181 cctgctgcag ctttcctgtt cagatacaaa attcctggag ataatggggt tttcctgtgc  
 241 tgtgtttact ctaatgttca ctttggcatt aatatttctg tcctacatgc acatcgtgag  
 301 gacgattttg agaattcctt ctactagtca gaggacaaag gccttttcta catgtttctc  
 361 ccacatgatt gtcatttcca tctcttatgg cagctgcatt ttatgtaca ttaagccctc  
 30 421 agcaaaagat agagtatctt tgagcaaggc agtggcgtgtg ctaatcacct cagtagctcc  
 481 catgctc (SEQ ID NO:254).

## OR158

35 LOCUS AF179779 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU154) gene, partial cds.  
 ACCESSION AF179779  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 40 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 55 /organism="Eulemur fulvus"

/db\_xref="taxon:13515"  
 gene <1..>488  
 /gene="EFU154"  
 CDS <1..>488  
 /gene="EFU154"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="MAICHPLRYPVFMNHRVCLFLASGCWFLGSVDGFMLTPITMTFP  
 YCRSREIHHSFCEVPAVTTLSGSDTSLYEMLMYLCCVLMMLIPVTVISSSYFILLTI  
 HRMGSAEGRKKAFAATCSSHMTVVILFYGAAIYTYMLPSSYHTPEKDMMVSVFYTILTP  
 VL" (SEQ ID NO:257).

BASE COUNT 92 a 163 c 95 g 138 t

#### ORIGIN

1 catggccatc tgccatccgc tccgttacc tcttctcatg aaccacaggg tgtgtctctt  
 61 cctggcatct ggctgctggt tcttgggac agtagatggc ttcattgctca ctccaatcac  
 121 catgaccttc ccctactgca ggtcccggga gattcaccat tcttctgcg aagtcctgctg  
 181 tgtaacgacg ctttctgct cagacacctc actctatgaa atgctcatgt acctgtgctg  
 241 tgtctctcatg ctctctcattc ctgtgacagt catttcaagc tctattcat tcattctcct  
 301 caccatccac aggatgggct cagcagaggg ccggaagaag gccttgcca cctgttctc  
 361 ccacatgacc gtgggtatcc tcttctatgg ggccgccatc tacacctaca tgctcccag  
 421 ctctaccac actctgaga aggacatgat ggtgtctgtc tttatacca tcttaactcc  
 481 tgtgctaa (SEQ ID NO:256).

#### OR159

25 LOCUS AF179780 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus EFU155 pseudogene, partial sequence.  
 ACCESSION AF179780  
 KEYWORDS

30 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.

35 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

40 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

45 source 1..488  
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 /gene="EFU155"  
 50 /pseudo

BASE COUNT 111 a 113 c 91 g 173 t

#### ORIGIN

1 tgttctatc tgtaagcccc tgcattacaa ggtcatcatg aatcgaagag tcgtgcacac  
 61 tgctcgtctt gcctcttgg ctggttcat tcttaactgt attccagca ctcattgttc  
 121 tcttaaagct tgattactgt ggatttaata ttattgacca tttacctgt gattatttc

181 ccctgctgca gcttctctgt tcagatacaa aattcctgga gataatgggg ttttctgtg  
 241 ctgtgttac tctaatttc actttggcat taatatttct gtcctacatg cacatcgtga  
 301 gaacgatttt gagaattcct tctactagtc agaggacaaa ggccttttct acatgttctt  
 361 cccacatgat tgcatctcc atctcttatg gcagctgcac tttatgtac attaacccct  
 5 421 cagcaaagga tagagtatct ttgagcaagg cagtggtgtg gctaatacacc tcagtagctc  
 481 ccatgcac (SEQ ID NO:258).

## OR160

10 LOCUS AF179781 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus EFU156 pseudogene, partial sequence.  
 ACCESSION AF179781  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 15 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnridae; Eulemur.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..486  
 30 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>486  
 /gene="EFU156"  
 /pseudo  
 35 BASE COUNT 119 a 110 c 93 g 164 t  
 ORIGIN  
 1 tgtggccatc tgcaagcccc tgcatatgt gaccgtcatg aacagcagag ttgcaggat  
 61 tctcatcatc tgtgttggg tggctggttt atgcataata atccctccac ttgcctggg  
 121 tttaaatcta aaattctgtg actctaactg gattgatcat ttggttgcg atgcatttcc  
 40 181 cctggtgaaa atctcatgct cagacacatg gttcatggaa cagacgggta tcattctgtc  
 241 tgtgctgacc ctgaatatga ctctaactg ttagtttctg tcatacgctt acatcatcaa  
 301 gacaattttt agattccctt ctgtccagca aaggaaaaag gccttttcca cctgtttctt  
 361 ccacatgatt gtggtttcca tcacctatgg cacgtgcatt tcatctaca tgaatcctac  
 421 agcaaaggaa gaagtgaccg ttaataaagt agtttcttg ctatttctt ctattttgct  
 45 481 acattg (SEQ ID NO:259).

## OR161

LOCUS AF179782 486 bp DNA PRI 31-DEC-2000  
 50 DEFINITION Eulemur rubriventer ERU157 pseudogene, partial sequence.  
 ACCESSION AF179782  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..486  
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 /db\_xref="taxon:34829"  
 gene <1..>486  
 /gene="ERU157"  
 /pseudo  
 BASE COUNT 78 a 157 c 112 g 139 t  
 ORIGIN  
 1 cgtggccatc tgccagccac cccaatacag cacagctatg agtccccagc tctgtgcact  
 61 catgctggcc atgtgtggc tgctaaccag ctgtctcgcg ttgatgcaca cgctgttgct  
 121 gaccctgttg gctttctgtg cccagaaggc catccccac ttctactgtg atcccagtgc  
 181 tctcctgaag ctgcctgtct cggatacccg cataaatgag ctgatgatca tcgccatggg  
 241 ctgacgttc ctactattc cctcacact gatcgtcttc tctacgtcc gcatctcctg  
 301 ggctgtgctt ggcattcgt ctctggcgg gcgatgcaag gccttctcca cctgtgggtc  
 361 tcattcacg gtggttctgc tctctatgg gtctcttatg ggtgtgtatt tgttctctcc  
 421 gtcattctac tctacagaga gggaaagcag gctgccattc tctacatggt gatcattccc  
 481 atgtta (SEQ ID NO:260).

**OR162**

LOCUS AF179783 484 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur rubriventer ERU159 pseudogene, partial sequence.  
 ACCESSION AF179783  
 KEYWORDS  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>484

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        /gene="ERU159"
        /pseudo
BASE COUNT   123 a   103 c   94 g   164 t
ORIGIN
5      1 tgtggccatc tgcaaccac tgaggtatcc catcatcatg aacagggtgt tataagtga
      61 aatggctgca tggcttga tcataggcta tctgatccc ttagtgaaa cagtctgac
      121 aatgatattg ccttctgtg gcaataatgt cattgatcat attacctgtg agatcctggc
      181 tctaaactc atatgctcag atattccat gaatgtgctt atcatggcag tggcaagtat
      241 tgttatattg gtgattcctc tgctgttcat tttatctcc tatgtattca tcctctcttc
10     301 catcctgaga attaattctt ctgaggggag aaagaaagcc ttgcaacct gtcagccca
      361 cctgactgtg gtcatttat tctatggtc agctctttt atgtacatga agcctaagtc
      421 aaagtacaca aaagtatctg atgaaatcat tgcactgtct tacggagtag taacccaat
      481 gttg (SEQ ID NO:261).

15     OR163

LOCUS   AF179784   487 bp   DNA       PRI    31-DEC-2000
DEFINITION  Eulemur rubriventer olfactory receptor (ERU160) gene, partial cds.
ACCESSION  AF179784
20     KEYWORDS   .
SOURCE     Eulemur rubriventer.
ORGANISM   Eulemur rubriventer
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
           Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.
25     REFERENCE  1 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
           TITLE    The olfactory receptor gene repertoire in primates and mouse:
           Evidence for reduction of function in primates
           JOURNAL   Unpublished
30     REFERENCE  2 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
           TITLE    Direct Submission
           JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
35     FEATURES   Location/Qualifiers
           source     1..487
                       /organism="Eulemur rubriventer"
                       /db_xref="taxon:34829"
           gene       <1..>487
40           /gene="ERU160"
           CDS       <1..>487
                       /gene="ERU160"
                       /codon_start=2
                       /product="olfactory receptor"
45           /translation="VAICHPLHYTTIMREELCTLLVAISWLLSCASSLSHTLLLTRLS
           FCAANVIPNFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFLCILVSYGYIGATI
           LRVPSTKGICKALSTCGSHLSVVSLEYGAIFGQYLFALSNKSIDKDIHVAMMYTVVTP
           ML" (SEQ ID NO:263).
BASE COUNT   91 a   143 c   104 g   149 t
50     ORIGIN
           1 tgttgcata tgtaccctc tccactacac caccatcatg agggagagc tctgcacctt
           61 attggtggct atatcctggc tcctgtcttg tgccagctcc ctctcccaca ccttctcct
           121 gaccggctg tcctctgtg ctgctaattg cattccaac ttctctgtg acctgtctgc
           181 tctgctcaag ctgctctgct cagacatctt cctcaatgag ctggtcatgt ttacagtagg
55     241 ggtggtgttc attacctgct cattcttatg tctctggta tcttacggt acattggggc

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301 caccatcctg agggtcctt caaccaaagg gatctgcaaa gcattatcca cgtgtgggtc  
 361 ccatctctct gtggtgtctc tgtactacgg ggcaatattt gggcagtacc tttcccagc  
 421 attaaagcaat tccattgaca aggacatcat tgtggctatg atgtacacgg tggtcacacc  
 481 catgttg (SEQ ID NO:262).

5

## OR164

LOCUS AF179785 475 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU161) gene, partial cds.

10 ACCESSION AF179785

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.

REFERENCE 1 (bases 1 to 475)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 475)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..475

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

30 gene <1..>475

/gene="ERU161"

CDS <1..>475

/gene="ERU161"

/codon\_start=2

35 /product="olfactory receptor"

/translation="VAICKPLHYMNIMSRQLCHLLVAGSWLGGFLHSIIQIFITIQSP

FCGPNVIDHYFCDLLPLFKLACTDTFVEGLTVLANSGLIPVCSLFILVSSYIIILVHL

RKHSAGRHKALSTCASHITVVILFFGPAIFLYMRPSSTFTEDKLMGVLYTVITPS" (SEQ ID

NO:265).

40 BASE COUNT 92 a 133 c 97 g 153 t

ORIGIN

1 cgtggcaatc tgcaagcctc ttattacat gaattattatg agtcgtcaac tgtgtcacct

61 tctgtgtgct ggttcttggc tgggaggctt tcttactct attattcaga tttttatcac

121 catccaatcg cctttttgtg gtccaacgt gattgaccac tacttctgtg acctctctgcc

45 181 attattcaag ctgctctgca ccgacacctt ttagagggg ctgactgtgt tggccaatag

241 tggcttaatt cccgtgtgct cctgtttat cctgtgtcc tctatatca ttattctggt

301 gcacttgagg aaacattctg cagaggggag gcacaaagcc ctctctacct gtgcctctca

361 catcaggtg gtcattttgt ttttggacc tgcatcttc ctctacatgc gaccttctc

50 421 taccttcaca gaagacaaac tcattgggtgt gttgtacaca gtcacaccc ccagt (SEQ ID NO:264).

## OR165

LOCUS AF179786 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU162) gene, partial cds.

55 ACCESSION AF179786

KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
10 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
20 gene <1..>487  
/gene="ERU162"  
CDS <1..>487  
/gene="ERU162"  
/codon\_start=2  
25 /product="olfactory receptor"  
/translation="VAISNPPLYVQAMPRKLCICFIICSYTGGFVNAILTSNTFTLD  
FCGDNVIDDFCDVPPLVKLACDVEGSYQAVLYFLLASNVISPAMLILASYVFIAAV  
LRVRSSRGLKAFSTCSSHLISVTLYYGSILYISRPSSSYSLERDKMVSTFYTVLFP  
TL" (SEQ ID NO:267).  
30 BASE COUNT 91 a 158 c 98 g 140 t  
ORIGIN  
1 tgtggccatc tccaaccccc cgctctatgt tcaggccatg ccaaggaaac tgtgcatctg  
61 ttccattatc tgttcataca ctggaggctt tgtaatgca ataattataa ccagcaacac  
121 attcacgttg gattttgtg gtgacaatgt catcgacgac ttttctgtg atgtccacc  
35 181 cctggtgaag ttggcctgtg atgtggaagg gagctaccag gctgtgctgt acttctctc  
241 ggcctccaac gtcattctcc cgcccatgct catctctgcc tctactgtct tcattctgc  
301 agcagcttg agggctcgct ccagccgggg cgccctcaag gccttctcca cgtgctctc  
361 ccacctgac tctgttacct tatactacgg ctccattctc tacattact ctcgcccaag  
421 ttccagctat tcctcgaga gggacaaaat ggtctctacc tttaacccg tgctgttccc  
40 481 cagctc (SEQ ID NO:266).

## OR166

LOCUS AF179787 478 bp DNA PRI 31-DEC-2000  
45 DEFINITION Eulemur rubriventer olfactory receptor (ERU163) gene, partial cds.  
ACCESSION AF179787  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 478)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
55 Evidence for reduction of function in primates



JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 10 /organism="Eulemur rubriventer"  
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 /gene="ERU163"  
 CDS <1..>478  
 15 /gene="ERU163"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAVCNPLHYLTVMNRQLCLQLVFACWCGGFIHSVTQVILVIQLP  
 FCGPNKLDSEYCDVPEVIKLACLDYVVEVLMTNSGLLSLVCFLVLIFS yatilttl  
 RTRLHQGQSKAFSTCASHLMVVS LIFVPCVFIYLRPFCSFSVDKIFS VFYMVITPML" (SEQ ID  
 20 NO:269).  
 BASE COUNT 85 a 132 c 108 g 153 t  
 ORIGIN  
 1 tgttgccgta tgtaaccctt tgcattacct gacggctatg aaccgccagc tctgccttca  
 61 gttggtttt gcctgctggt gtgggggttt catccactct gtcacacagg ttatactggt  
 25 121 catccagctg cccctctgtg gcccacaaca attggacagt ttctactgtg atgtcccaga  
 181 ggtcatcaag ctggcctgcc tggacacctg tgggtagaa gtgctgatgg ttaccaacag  
 241 tggctgcta tctctgtct gcttcttggc cttgatattc tcttatgcca ccatcctgac  
 301 caccctgaga actgcctcc accagggcca gagcaaggcc ttctctacct gtgcctccca  
 361 cctaattgtg gtcagcctga tctttgtgcc atgtgtatc atctactga ggcctttctg  
 30 421 cagcttctct tgggataaga tattctctgt gttttacatg gtgatcacac ctatgttg (SEQ ID NO:268).

## OR167

LOCUS AF179788 487 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Eulemur rubriventer olfactory receptor (ERU164) gene, partial cds.  
 ACCESSION AF179788  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 /db\_xref="taxon:34829"

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 /gene="ERU164"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYTTIISTRVCILLVCSSWLAGFLIIFPPIILLQLD  
 FCASNIIDHFICDSSPILQLSCTNTHFLELMAFCLAVVTLMTLTLVILSYTNIIRTI  
 LRIPSMSQRKKAFSTCSSHIIVVLSYGSCIFMYIKPSTRERVTL SKGVAVVNTSVAP  
 LL" (SEQ ID NO:271).  
 BASE COUNT 116 a 116 c 79 g 176 t  
 ORIGIN  
 1 tgtggccatc tgcaaacctc ttcattacac aaccatcatt agcaccaggg ttgtatcct  
 61 tcttctgt agctcctggc ttgcaggatt ctgatcatc ttccaccaa taatcctct  
 121 tctgcagttg gactctgtg cctccaatat aattgatcat ttatctgtg attctctcc  
 181 aattctcgag ctttctgta caaacactca ctttctagaa ctcatggcat ttgttttagc  
 241 cgtggtgaca ctcatggta ccttgacctt agttattctc tcctatacaa atattatccg  
 301 gacaattcta agaattcctt ctatgagta aaggaaaaaa gcctttcca ctgttcctc  
 361 ccatataata gttgttccc tctctatgg tagttgtatc ttcatgtaca taaagcctc  
 421 tacaagggaagggtgactt taagcaaagg agtagctgtg gtaataactt cagtggctcc  
 481 tcttttg (SEQ ID NO:270).

## OR168

25 LOCUS AF179789 483 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur rubriventer ERU165 pseudogene, partial sequence.  
 ACCESSION AF179789  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 30 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
 REFERENCE 1 (bases 1 to 483)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 483)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 45 /organism="Eulemur rubriventer"  
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 /gene="ERU165"  
 /pseudo  
 50 BASE COUNT 98 a 144 c 108 g 133 t  
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 1 cgttggccatc tgcaagcccc tccactaccc ccgtgctcat gacgagcagg gtctgcacac  
 61 agctcatcct cgctcctgg ctggcagggt tctcctcat cattgtgctt gtcacctga  
 121 ccagtcagct tccattctgt gacaccacaca tcaaccactt cttctgtgac tatacacctc  
 55 181 taatggaggt ggtctgcagt gggccaaagg tgctggagat ggtggatttt accctggcct

241 ttgtggcact gctcagcacc ttgtgtgctga tcacctgtc ctacatccag atcatcagga  
 301 cgattgtcag gatccctct gtccaggaga ggaaaaaggc ttctccacc tgttctccc  
 361 atgtcatcgt ggttaccatg tgctatggaa gctgttttt tatgtatgtc aagccctccc  
 421 caggcaaaagg ggttgatcta aacaaaggag tgtcttaac aatacaatta ttccccccct  
 5 481 ctt (SEQ ID NO:272).

## OR169

LOCUS AF179790 486 bp DNA PRI 31-DEC-2000  
 10 DEFINITION Eulemur rubriventer olfactory receptor (ERU167) gene, partial cds.  
 ACCESSION AF179790  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 20 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 30 /db\_xref="taxon:34829"  
 gene <1..>486  
 /gene="ERU167"  
 CDS <1..>486  
 35 /gene="ERU167"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLRYTDMTPRLCGLLVSLSLICSADALLHSLMLLQLS  
 FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSQTQIATSI  
 LKMPSSGRKYKAFSTCGSHLSVVSFLFYGTGLGVYISSAVSDSSRRRTAVASVMYTVVTP  
 40 C" (SEQ ID NO:274).  
 BASE COUNT 83 a 139 c 107 g 157 t  
 ORIGIN  
 1 tgtggccatc tgcaccctc tgagatacac agacatcatg actcctcgtc tgtgtgtct  
 61 gctggtttca ctttcctgt ccatgtgtc cgcggatgcc ctgtccaca gcctcatgct  
 45 121 gctgcagctg tccttctgca cagacctga aatctccctt ttcttctgt aagtcgttca  
 181 ggtcgtcaag ctcgctgtc cagataccct cgtcaacaac ctctgatct attttcagc  
 241 ttgcacctg ggtggcattc ctctgtctgg catcatttt tcttacctc aatagccac  
 301 ctccatttg aaaatgccgt catcgggcag aaagtataaa gcctttcca cctgtgggtc  
 361 tcacctgtca gttgttccc tgttctatgg gacaggttg ggggtgtaca tcagtctgc  
 50 421 agttctgac tcttcaagga ggactgcgtt ggcttcagt atgtacctg tggctactcc  
 481 ctgttg (SEQ ID NO:273).

## OR170

55 LOCUS AF179791 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU168) gene, partial cds.  
 ACCESSION AF179791  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 5 ORGANISM Eulemur rubriventer  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 15 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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     CDS <1..>487  
 25 /gene="ERU168"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICHPLTYTDMTPRLCGLLVSLSLICSADALLHSLMLLQLS  
     FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSYTQIATSI  
 30 LKMPSSGRKYKAFSACGSHLSVVSFLFYGTGLGVYISSAVSDSSRRRTAVASVMYTVVTP  
     VL" (SEQ ID NO:276).  
 BASE COUNT 82 a 140 c 108 g 157 t  
 ORIGIN  
 1 tgtggccatc tgtcaccctc tgacatacac agacatcatg actcctcgtc tgtgtggtct  
 35 61 gctggtttca ctttccctgt ccatttgctc cgcggatgcc ctgtccaca gcctcatgct  
 121 gctgcagctg tcctctgca cagacctga aatctccctt ttctctgtg aagtegttca  
 181 ggtcgtcaag ctgcgtgct ccgataccct cgtcaacaac ctctgatct atttgcagc  
 241 ttgcaccttg ggtggcattc ctctgtctgg catcatttt tcttacctc aaatagccac  
 301 ctccatttg aaaatgccgt catcgggcag aaagtataaa gccttttccg cctgtgggtc  
 40 361 tcacctgtca gttgttccc tgttctatgg gacaggttg ggggtgtaca tcagttctgc  
 421 agtttctgac tcttcaagga ggactgoggt ggcttcagtg atgtacctg tggtcactcc  
 481 cgtgttg (SEQ ID NO:275).

## OR171

45 LOCUS AF179792 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY172) gene, partial cds.  
 ACCESSION AF179792  
 KEYWORDS .  
 50 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Macaca.  
 55 REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
 source 1..486  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>486  
 15 /gene="MSY172"  
 CDS <1..>486  
 /gene="MSY172"  
 /codon\_start=1  
 /product="olfactory receptor"  
 20 /translation="PAICQLRYYRVLNMHRLCVLLVGAAWVLCLLKSVTETVIAMRLP  
 FCGHHVVSHFTCEILAVLKLTCGNTSVSEVLLVGSILLPVPLAFICLSYLLILATI  
 LRVPSAAGCRKAFSTCSAHLAVVLLFYSTIIIFTYMKPKSKEAHISDEVFTVLYAMVTP  
 ML" (SEQ ID NO:278).  
 BASE COUNT 79 a 163 c 125 g 119 t  
 25 ORIGIN  
 1 cctgccatct gccagccact caggtaccgc gtgctcatga accaccggct ctgtgtgctg  
 61 ctgtgaggag ctgctgggt cctctgctc ctcaagtcgg tgactgagac agtcattgcc  
 121 atgaggctgc cttctgtgg ccaccacgtg gtcagtcact tcactgcga gatcctggcg  
 181 gtgtgaagc tgactgagg taacacatcg gtcagcgagg tcttctgct ggtgggctcc  
 30 241 atcctgtgc tgcctgtgc cctggcattc attgcctgt cctacttgc catcctggcc  
 301 accatcctga ggggtccctc agctgctggg tgccgcaaag cttctccac ctgctcagca  
 361 cactggctg tgggtgctgt ttctacagc accatcatct tcacgtacat gaagcccaag  
 421 agcaagggaag cccacatctc tgaagagtc ttcacagtcc tctacgcat ggtcacacc  
 481 atgttg (SEQ ID NO:277).  
 35  
**OR172**  
 LOCUS AF179793 489 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus MSY173 pseudogene, partial sequence.  
 40 ACCESSION AF179793  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 489)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 489)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 55 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..489

                  /organism="Macaca sylvanus"

                  /db\_xref="taxon:9546"

gene             <1..>489

                  /gene="MSY173"

                  /pseudo

BASE COUNT    95 a 120 c 104 g 170 t

ORIGIN

1 cgtggccatc tgtaaccac tgtgtacac ggtcaccatg tctcccaga tgtgttgc

61 ccttttgcg ggtgtctatg ggatgggggt tttggggct gtgactcata tgggaacat

121 aacgtttatg tccttttgag gagacaacct tgtcaatcac tacatgtgtg acctcttcc

181 tctccttgag ctctcttgca acagcaccta cataaattg ctgggtgttt ttattattgt

241 gaccaatggc attgggggtgc caattgtcac catttttatc tcttatggtt ttattcttc

301 cagcattctc cacattagct ccacagaggg cagggtctaaa gccttcagta cctgcagttc

361 cacataattg tggtatcgct gttctttggg tcagggtcctt tcatgtacct cacaccacct

421 tctagtctac ccctggacca ggggaacgtg tcctccattt ttatactgc tgtaatgcc

481 atgtagatt (SEQ ID NO:279).

**OR173**

LOCUS AF179794 481 bp DNA PRI 31-DEC-2000

DEFINITION Macaca sylvanus olfactory receptor (MSY174) gene, partial cds.

ACCESSION AF179794

KEYWORDS .

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

REFERENCE 1 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..481

                  /organism="Macaca sylvanus"

                  /db\_xref="taxon:9546"

gene             <1..>481

                  /gene="MSY174"

CDS              <1..>481

                  /gene="MSY174"

                  /codon\_start=2

                  /product="olfactory receptor"

                  /translation="VAICKPLHYATIMSQPMCGFLMGVAGILGFVHGGIQTFLIAHLP

FCGPNVIDHFMCDLVPLLELACTDTHTLGPLIAANSGSLCFLIFSMLVASYVILCSL

RTHISEGRHKVLSSCTSHIFVVILFFVPCSYLRLPLTSFFPTDKAVTVFCTLFTPML" (SEQ ID

NO:281).

BASE COUNT 92 a 126 c 97 g 166 t

ORIGIN

1 tgtggccatc tgtaagccct tgcactatgc aaccatcatg agtcaacctg tgtgtggatt  
61 cctgatgggg gtggctggga ttctgggatt tgtgcatgga gggatccaga cttgttcat  
5 121 agcccactta ccattctgtg gccctaagt catcgaccac ttatgtgtg atttagtacc  
181 tcttctagag ctggcctgca cagacactca caccttgggg cctctgatag ctgccaacag  
241 tggatcattg tgtttcctca tttttccat gctggttgct tctatgtca tcatcctgtg  
301 ctcctaagg actcatatct ctgaaggcg tcacaaagtt ctgtctagt gtacctctca  
361 tatcttgtt gtcactttat tctttgtccc ttgttcatac ctgtatctaa gacctctaac  
10 421 ctccttctc cccactgaca aagctgtgac tgtgtttgc accctattta cacctatgtt  
481 g (SEQ ID NO:280).

OR174

15 LOCUS AF179795 402 bp DNA PRI 31-DEC-2000

DEFINITION *Macaca sylvanus* MSY175 pseudogene, partial sequence.

ACCESSION AF179795

KEYWORDS .

SOURCE Barbary ape.

20 ORGANISM *Macaca sylvanus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

*Macaca*.

REFERENCE 1 (bases 1 to 402)

25 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 402)

30 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35 source 1..402

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>402

/gene="MSY175"

40 /pseudo

BASE COUNT 89 a 105 c 77 g 131 t

ORIGIN

1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcatgca  
61 gcttgtgctt ggggtgttggc ttgctggttt ctctcacct ttccaccact cctcttaggc  
45 121 ctaaactctg acttctgtgc ctgcctccaa cgtcattaat catttctact gtgacactac  
181 tccactcctg cagatttctt gcactgacac acagctcctg gacaggatgg gattcatttc  
241 agcattgttg acactcttag tcacattggt aatgggtgat gtatcatgat atccctttct  
301 tatggcagtt gcatctcat gtatgtaag ccatcggtca aacaaagat atatttttca  
361 aagggaattt tgggtctcaa cacctctgtc gttccattt tg (SEQ ID NO:282).

50

OR175

LOCUS AF179796 487 bp DNA PRI 31-DEC-2000

DEFINITION *Macaca sylvanus* olfactory receptor (MSY176) gene, partial cds.

55 ACCESSION AF179796

KEYWORDS .  
SOURCE Barbary ape.  
ORGANISM *Macaca sylvanus*  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
10 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
15 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Macaca sylvanus"  
20 /db\_xref="taxon:9546"  
gene <1..>487  
/gene="MSY176"  
CDS <1..>487  
25 /gene="MSY176"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICNPLLYALVVSPKVCRLLVSLTYLQSLITALTVSSCVFSVS  
YCSSNIINHFCDDVPLLALSCSDTYIPETA VFIFSGTNLFFSMTVVLISYFNIVITI  
LRIRSSEGRQKAFSTCASHMIAVVVFYGTLLFMLYQPRSNHSLD TKMASVFYTLIIP  
30 ML" (SEQ ID NO:284).  
BASE COUNT 104 a 123 c 87 g 173 t  
ORIGIN  
1 cgtggetatt tgcaaccctc tgctctacgc attagtgggtg tctccaaagg tatgtcgtct  
61 gctgggtgcc ctacataacc ttacagagtct tatcacagcc ctactgtct ctctcgtgt  
35 121 gttctctgtg tcatactgtt ctccaacat catcaacat tttactgtg acgatgtccc  
181 ttgctagca ttgtcgtgtt ctgataccta cattccagaa acagcagtgt ttatcttttc  
241 agggaccaat ttgttttct ccatgaccgt tgttctgata tcctactca acattgttat  
301 taccattttg aggatacgtt cctcagaagg acgacaaaaa gcctttcca cgtgtgcttc  
361 tcacatgata gctgtgggtg tgttctatgg gactctcctt ttcattgtatt tgcaaccaag  
40 421 gagtaatcac tcattagata ctgacaaaat ggctctgggc ttctacacc tgatcatacc  
481 tatgttg (SEQ ID NO:283).

## OR176

45 LOCUS AF179797 487 bp DNA PRI 31-DEC-2000  
DEFINITION *Macaca sylvanus* olfactory receptor (MSY177) gene, partial cds.  
ACCESSION AF179797  
KEYWORDS .  
SOURCE Barbary ape.  
50 ORGANISM *Macaca sylvanus*  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.  
REFERENCE 1 (bases 1 to 487)  
55 AUTHORS Giorgi,D.G. and Rouquier,S.P.



TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..487  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>487  
 /gene="MSY177"  
 15 CDS <1..>487  
 /gene="MSY177"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYAIIMGQSQCVTLVAGSWVIACACALLHTLLLAWLS  
 20 FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHTAVTI  
 LQIPSTNGICKALSTCGSHLSAVTLYYGTIIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
 ML" (SEQ ID NO:286).  
 BASE COUNT 94 a 146 c 91 g 156 t  
 ORIGIN  
 25 1 tgtggccatc tgcaccctc tacattatgc catcatcatg ggtcagagtc agtgtgtcac  
 61 gctgggtgct gggctcctggg tcacgcttg tgcgtgtgct ctttgcaca ctctcctcct  
 121 ggcctggctt tcttctgtg ctgacacat catccctcac ttctctgtg accttgggtc  
 181 cctgctcaag ttgtcctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg  
 241 attgacagcc attatgcttc cattcctgtg tatcctggtt tcttatggtc acactgcagt  
 30 301 caccatcctc cagattccct ctactaatgg catatgcaaa gccttgcca cttgtggatc  
 361 ccaccttca gcagtgactc tctattatgg gaccattatt ggtctctatt ttctccccc  
 421 atccagcaac actaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
 481 catgttg (SEQ ID NO:285).  
 35 **OR177**  
 LOCUS AF179798 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY178) gene, partial cds.  
 ACCESSION AF179798  
 40 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 45 Macaca.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 55 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..487

                  /organism="Macaca sylvanus"

                  /db\_xref="taxon:9546"

5            gene            <1..>487

                  /gene="MSY178"

                  CDS            <1..>487

                  /gene="MSY178"

                  /codon\_start=2

10            /product="olfactory receptor"

                  /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC

                  FCADNVIPHFFCDMSALLKLACSDTQVNELAIFITGGLILVIPFLILGSYARIVSSI

                  LKVPSSKGICKAFSTCGSHLSVVSIFYGTVIGLYFCPSANSSTLKETVMAMMYTVVTP

                  ML" (SEQ ID NO:288).

15    BASE COUNT    83 a 144 c 105 g 155 t

ORIGIN

                  1 tgtggccatc tgcttcccc tgactacac cgcccatcatg agcccatgc tctgtctgc

                  61 cctgggtggc ctgtcctggg tactgaccac cttccatgcc atgttacaca ctttactcat

                  121 ggccaggttg tgttttttg cagacaatgt gatccccac ttttctgtg atatgtctgc

20            181 tctgtgaag ctggcctgct ctgacactca agttaatgaa ttggcgatat ttatcacggg

                  241 agggctgatt cttgtcatcc cattcctact catcctggg tcctatgcac ggattgtctc

                  301 ctccatctc aaggtccctt cgtctaaggg tatctgcaag gccttctcta cttgtggctc

                  361 ccacctctc gtgggtgcac tgttctatgg gaccgtatt ggtctctact tctgcccac

                  421 agctaatagt tctactctaa aggagactgt catggctatg atgtacactg tggtgacccc

25            481 catgctg (SEQ ID NO:287).

## OR178

LOCUS    AF179799    484 bp    DNA            PRI    31-DEC-2000

30    DEFINITION    Macaca sylvanus olfactory receptor (MSY179) gene, partial cds.

                  ACCESSION    AF179799

                  KEYWORDS    .

                  SOURCE        Barbary ape.

                  ORGANISM    Macaca sylvanus

35            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

                  Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

                  Macaca.

                  REFERENCE    1 (bases 1 to 484)

                  AUTHORS    Giorgi,D.G. and Rouquier,S.P.

40            TITLE        The olfactory receptor gene repertoire in primates and mouse:

                  Evidence for reduction of function in primates

                  JOURNAL    Unpublished

                  REFERENCE    2 (bases 1 to 484)

                  AUTHORS    Giorgi,D.G. and Rouquier,S.P.

45            TITLE        Direct Submission

                  JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

                  1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..484

50            /organism="Macaca sylvanus"

                  /db\_xref="taxon:9546"

                  gene            <1..>484

                  /gene="MSY179"

                  CDS            <1..>484

55            /gene="MSY179"

/codon\_start=2  
 /product="olfactory receptor"  
 /translation="CAICCPHYTTAMSPKLCILLSLCWVLSVLYGLIHTFLMTT  
 5 FCGSRKIHYIFCEMYVLLRLACSDTQINHTVLIATGCFIFLIPFGFMIISYVLIVRAI  
 LRIPSVSKKYKAFSTCASHLGVVSLFYGTLCMVYLKPLHTYSVKDSVATVMYAVVTPM  
 M" (SEQ ID NO:290).

BASE COUNT 102 a 139 c 93 g 150 t

#### ORIGIN

1 atgtgccatc tgtgcccc tccactacac cacagccatg agccctaagc tctgtatctt  
 10 61 actcctttcc ttgtgtggg tcttatctgt gctctatggc ctcatacaca ccttcctcat  
 121 gaccacgggt acccttctgt ggtaacgaaa aatccactac atcttctgtg agatgtatgt  
 181 attgctgagg ctggcatgtt ccgacactca gattaatcac acagtgtgta ttgccacagg  
 241 ctgtttatc ttctcattc cctttgatt catgatcatt tcctatgtgt tgattgtcag  
 301 agccatcctc agaataacct cagtctctaa gaaatacaaa gccttctcca cttgtgcctc  
 15 361 ccatttgggt gtatgtctcc tcttctatgg gacactttgt atgtataacc tgaagccctt  
 421 ccatacctac tctgtgaagg actcagtagc cacagtgtatg tatgctgtgg tgacacccat  
 481 gatg (SEQ ID NO:289).

#### OR179

20 LOCUS AF179800 487 bp DNA PRI 31-DEC-2000  
 DEFINITION *Macaca sylvanus* MSY180 pseudogene, partial sequence.  
 ACCESSION AF179800  
 KEYWORDS .  
 25 SOURCE Barbary ape.  
 ORGANISM *Macaca sylvanus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 30 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 35 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 40 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>487  
 45 /gene="MSY180"  
 /pseudo

BASE COUNT 92 a 143 c 100 g 152 t

#### ORIGIN

1 tgtgccata tgcaccctc tccattacac tgccatcatg agggagagc tctgtgtctt  
 50 61 cttagtggt gtatctttaa ttctgtcttg tgccagctcc ctctctcaca ccttctctc  
 121 gaccacgtg tcttctgtg ctgcgaacac catccccac atcttctgtg accttctgtc  
 181 cctgtcaaag ctgtcctggt cagatatctt cctcaatgag ctggatcatg tcacagtagg  
 241 ggtgtgtgct attaccctgc cattcatgtg tatcctggta tcatatggct acactggggc  
 301 caccatcctg agggctcctt caaccaaagg gatccacaaa gcattgtcca catgtgcctc  
 55 361 ccattctctt gtggtttctc tctattatgg gtcaatatt ggccagtaac atttcccaac

421 tgtaagcagt tctattgaca aggatgttac tgtggctctc atgtacatcg tggtcacacc  
481 cgtgttg (SEQ ID NO:291).

## OR180

5 LOCUS AF179801 487 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus MSY181 pseudogene, partial sequence.  
ACCESSION AF179801  
KEYWORDS .  
10 SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
15 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
20 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
25 FEATURES Location/Qualifiers  
source 1..487  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>487  
30 /gene="MSY181"  
/pseudo  
BASE COUNT 92 a 144 c 100 g 151 t  
ORIGIN  
1 tgcctgccata tgcaccctc tccattacac tgccatcatg agggaagagc tctgtgtctt  
35 61 cttagtggct gtattctgaa ttctgtcttg tgccagctcc ctctctcaca ccttctcct  
121 gaccacagctg tctttctgtg ctgcgaacac catccccac atcttctgtg accttgcctg  
181 cctgtcaag ctgtcctggc cagatatctc cctcaatgag ctggatcatg tcacagtagg  
241 ggtgggtggc attaccctgc cattcatgtg tctcctggta tcatatggct acactggggc  
301 caccatcctg agggctccct caaccaaagg gatccacaaa gcattgtcca catgtgcctc  
40 361 ccatctctct gtggttctc tctattatgg gtcaatatt ggccagtaac atttcccaac  
421 tgtaagcagt tctattgaca aggatgttac tgtggctctc atgtacatcg tggtcacacc  
481 cgtgttg (SEQ ID NO:292).

## OR181

45 LOCUS AF179802 487 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY182) gene, partial cds.  
ACCESSION AF179802  
KEYWORDS .  
50 SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
55 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 15 gene <1..>487  
 /gene="MSY182"  
 CDS <1..>487  
 /gene="MSY182"  
 /codon\_start=2  
 /product="olfactory receptor"  
 20 /translation="VAICKPLHYMVIMNRRVCTLLVLCSSWVAGLMIIVPPLSLGLQLE  
 FCGSNAIDHFCSDAGPLLKISCSDTWVIEQIVILMAVFALHITLVCVILSYLYIVRTI  
 LRFPSVQQRKKAFSTCSSHMIVVSIAYGSCIFVYIKPSAKDEVAINKGVSVLTTSVAP  
 LL" (SEQ ID NO:294).  
 BASE COUNT 115 a 113 c 98 g 161 t  
 25 ORIGIN  
 1 tgtggccatc tgtaaacccc ttcattatat ggatcatcatg aacaacaggg tgtgtacctt  
 61 attagtcttc tgcagtggg tggtggctt gatgatcatt gtccaccac tagcttagg  
 121 cctccagctc gaattctgtg gctccaatgc cattgatcat ttagctgtg atgcaggctc  
 181 tctcctaag atctcatgct cagacacatg ggtaataga cagatagta tacttatggc  
 241 tgtattgca ctattatca ccctagttg tgtgattctg tcctactgt acatagtcag  
 30 301 aacaattctg aggttcctt ctgttcagca aaggaaaaag gcctttcta cctgttcac  
 361 ccacatgatt ggggttcca ttgcctatg aagctgcac ttcgtctata tcaagccctc  
 421 tgcaaaagat gaagtggcca taaataaagg agtttcagtt ctactactt ctgtgcacc  
 481 cttgttg (SEQ ID NO:293).  
 35  
**OR182**  
 LOCUS AF179803 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA169) gene, partial cds.  
 40 ACCESSION AF179803  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 55 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..487

                  /organism="Callithrix jacchus"

                  /db\_xref="taxon:9483"

5            gene            <1..>487

                  /gene="CJA169"

CDS            <1..>487

                  /gene="CJA169"

                  /codon\_start=2

10            /product="olfactory receptor"

                  /translation="VAICRPLYYSTVMSPQVCALILALCWVLTNVVALTHTLLMARLS

                  FCVTGEIAHFFCDITPVLKLSCDTHINEMMVFLGGTVLIVPFICIVTSYIHIVPAI

                  LRVRTCGGAGKAFSTCSSHLVICIFYGTLFSAYLCPPSIASEEKDIAAAALYTIVTP

                  ML" (SEQ ID NO:296).

15    BASE COUNT    89 a 147 c 103 g 148 t

ORIGIN

          1 tgtggccatt tgccgcccc tgctactc cacagtcac agccccaag tctgtgccct

          61 aatccttga ttgtctggg tctcacaa ttgtgtgcc ctgactaca cactcctcat

          121 ggctcgactg tctctctgtg tgactgggga aatagtcac ttttctgtg acatcactcc

20            181 tgctctgaag ctatcatgtt ctgacacca catcaacgag atgatggtt ttgtctggg

          241 aggcacagta ctattgtcc ctttatatg cattgtcacc tctacatcc acattgtgcc

          301 tgctatcctg aggtgccgaa cctgtggtgg ggcgggcaag gcctttcca cctgcagttc

          361 ccacctctgc attgtttgta tattctatgg gaccctctc agtgcctacc tgtgtcctcc

          421 ctctattgcc tctgaagaga aggacattgc agcagctgca ctgtatacca tagtgactcc

25            481 catgttg (SEQ ID NO:295).

## OR183

LOCUS    AF179804    486 bp    DNA            PRI    31-DEC-2000

30    DEFINITION    Callithrix jacchus olfactory receptor (CJA170) gene, partial cds.

          ACCESSION    AF179804

          KEYWORDS    .

          SOURCE    Callithrix jacchus.

          ORGANISM    Callithrix jacchus

35            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

          Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

          REFERENCE    1 (bases 1 to 486)

          AUTHORS    Giorgi,D.G. and Rouquier,S.P.

          TITLE    The olfactory receptor gene repertoire in primates and mouse:

40            Evidence for reduction of function in primates

          JOURNAL    Unpublished

          REFERENCE    2 (bases 1 to 486)

          AUTHORS    Giorgi,D.G. and Rouquier,S.P.

          TITLE    Direct Submission

45            JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

          1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..486

                  /organism="Callithrix jacchus"

50            /db\_xref="taxon:9483"

          gene            <1..>486

                  /gene="CJA170"

CDS            <1..>486

                  /gene="CJA170"

55            /codon\_start=1

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                    /product="olfactory receptor"
                    /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS
                    FCTDLEIPRFFCELNQVIHLACSDTFLNDVVMYLAADVLLGGGPLAGILYSYSKIVSSI
                    RAISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP
5                     ML" (SEQ ID NO:298).
BASE COUNT   96 a  135 c  102 g  153 t
ORIGIN
    1 gtggccatct gtcaccact gcactacaca gtcaccatta accccagact gtgtggactg
    61 ctggtctgg catcttgat cctgagtgcc ctgaattect cattacaac ctaaatagtg
10   121 ctgcggtctt cctctgcac agactggaa atccccgct tttctgca acttaatcag
    181 gtcaccacc ttgcctgttc tgacctttt ctaaatgatg tggatgta ttggccgct
    241 gtgtgtgtgg ggggtgtcc cctgcaggg attcttact ctactctaa gatagttcc
    301 tccatactg caatctcat agctcaggg aagtacaagg cattttcac ctgtgtatct
    361 cacatctaa ttgtctctt atttatgtt acactcctag gtgtgtacct tagttctgt
15   421 gcaactggca actcacatc aagagctgca gcctcggtga tgtacctgt ggtcaccccc
    481 atgctg (SEQ ID NO:297).

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## OR184

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20  LOCUS   AF179805  487 bp  DNA      PRI   31-DEC-2000
     DEFINITION  Callithrix jacchus olfactory receptor (CJA171) gene, partial cds.
     ACCESSION   AF179805
     KEYWORDS
     SOURCE      Callithrix jacchus.
25  ORGANISM  Callithrix jacchus
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
           Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
     REFERENCE  1 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
30  TITLE     The olfactory receptor gene repertoire in primates and mouse:
           Evidence for reduction of function in primates
           JOURNAL  Unpublished
     REFERENCE  2 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
35  TITLE     Direct Submission
           JOURNAL  Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
     FEATURES   Location/Qualifiers
           source      1..487
40           /organism="Callithrix jacchus"
           /db_xref="taxon:9483"
           gene        <1..>487
           /gene="CJA171"
           CDS         <1..>487
45           /gene="CJA171"
           /codon_start=2
           /product="olfactory receptor"
           /translation="VAICNPLLYMVTMSPQVCLLLLGVYGMGALGAVAHMGNIMFMT
           FCAETLVNHMCDILPPELSCNSSYINLLVFIIIVTIGIGVPIVTIFISYGFILSSI
50           LHISSAEGRSKAFSTCSSHIVVLLFFGSGAFMYLKPPSILPLDQGVSSIFYTAVVP
           MF" (SEQ ID NO:300).
BASE COUNT   88 a  118 c  107 g  174 t
ORIGIN
    1 cgtggccatc tgtaaccac tgtgtacat ggtcaccatg tctcccagg tgtgtctgt
55   61 ccittgttg ggtgtctatg ggatgggggc ttgggggct gtggtcata tgggaacat

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121 aatgttatg accttttg cagaaacct tgcatacac tacatgtg acatcctcc  
 181 cctcctgag ctctcctgca acagctctta cataaattg ctgttggtt ttattattg  
 241 gaccattggc attggggtgc ccattgtcac cattttatc tcttatggtt ttattcttc  
 301 cagcattctc cacattagt ctgctgaggg caggtctaaa gccttcagta cctgcagctc  
 5 361 ccacatagt gtggtattgc ttttcttgg gtcaggagct ttatgtacc tcaaaccacc  
 421 ttctattcta cccctggacc aggggaaagt gtctccatt tttatactg cggtggtgcc  
 481 catgtt (SEQ ID NO:299).

## OR185

10 LOCUS AF179806 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA196) gene, partial cds.  
 ACCESSION AF179806  
 KEYWORDS  
 15 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 487)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..487  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 gene <1..>487  
 /gene="CJA196"  
 35 CDS <1..>487  
 /gene="CJA196"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LAICHPLHYSSKMSLCSTLMLGCLWTTASLHALLHTLLARLD  
 40 FCASNVIPYFFCDLVPLLQLSCSDTRLNQLMIVLVGGLIILLPFLGILGSYTCIAAAV  
 LRVPSARGTWKAFSTCGSHLTMVILFYGTISGVYLRPSSSHSTDKDSLASVMYMVVTP  
 ML" (SEQ ID NO:302).

BASE COUNT 78 a 176 c 105 g 128 t

## ORIGIN

45 1 ctggccatc tgccaccgc tgcactact ctccaagatg agcctgtgca gctgcacct  
 61 aatgtgggc tgcttatgga cactgccag cctccatgcc ctctgcaca cctctctt  
 121 ggcccgctg gactctgtg ccagcaatgt tatccctac ttctctgtg acctgttcc  
 181 cctgtccag ctctcctgt ctgacaccg actcaaccag ctcatgatt tgctggtggg  
 241 gggcctgatc atctcctgc cttccttgg cattctcgtt tctacacat gcattgcagc  
 50 301 tgcagtctc agagtccct ctgccagggg taegtgaag gcctttcca cctgtgctc  
 361 ccacctgacc atggtatcc ttcttatgg caccatcca ggggtctacc tgaggccctc  
 421 atctccac tccacagaca aggactcact agcctcagt atgtacatgg tagtgacccc  
 481 catgctg (SEQ ID NO:301).

## 55 OR186



LOCUS AF179807 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA197) gene, partial cds.  
 ACCESSION AF179807  
 5 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 10 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 15 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 20 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 gene <1..>487  
 25 /gene="CJA197"  
 CDS <1..>487  
 /gene="CJA197"  
 /codon\_start=2  
 /product="olfactory receptor"  
 30 /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS  
 FCTDLEIPHFCELNQVIHLACSDTFLNDVVMYLA AVLGGGPLAGILYSYSKIVSSI  
 RAISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAASVMYTVVTP  
 ML" (SEQ ID NO:304).  
 BASE COUNT 98 a 134 c 100 g 155 t  
 35 ORIGIN  
 1 ttgtgccata tgtcacccac tgcactacac agtcaccatt aaccccagac tgtgtggact  
 61 gctggtctg gcatcctgga tctgagtgcc cctgaattcc tcattacaaa ccttaatagt  
 121 gctgcggctt tcttctgca cagacttgga aatccccac ttttctgcg aacttaatca  
 181 ggcatccac ctgcctggt ctgacacttt tcttaatgat gtggtgatgt atttgccgc  
 40 241 tgtgctgctg gggggtggtc ccctgcagg gattcttacc tcttactcta agatagtttc  
 301 ctccatacgt gcaatctcat cagctcaggg gaagtacaag gcattttcca cctgtgtatc  
 361 tcacatctta attgtctct tattttatgg tacactccta ggtgtgtacc ttagtctgc  
 421 tgcaactggc aactcacatt caagagctgc agcctcgggt atgtacactg tggtcacccc  
 481 catgctg (SEQ ID NO:303).  
 45

## OR187

LOCUS AF179808 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA198) gene, partial cds.  
 50 ACCESSION AF179808  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 55 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 5 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 15 gene <1..>487  
 /gene="CJA198"  
 CDS <1..>487  
 /gene="CJA198"  
 /codon\_start=2  
 20 /product="olfactory receptor"  
 /translation="IAICSPLLYNVIMSYHFCFRLTVGVYILGILGSTIHTSSMLRLF  
 LCKTNVINHYFCDLFPILLESCSSTYINELLVLVLSALNLTLPALTILASYIFTIASI  
 LHIRSTEGRSKAFSTCSSHISAVAVFFGSAAFMYLQPSSVSSMDQGKVSSVFYTTVVP  
 ML" (SEQ ID NO:306).  
 25 BASE COUNT 101 a 138 c 87 g 161 t  
 ORIGIN  
 1 cattgccatc tgtagccctc tgctgtacaa tgatcatcg tctatcact tctgctccg  
 61 gctcacagtg ggagtttaca ttttaggcat ccttgatct acaattcaca ccagctctat  
 121 gttgagactc ttctgtgca aaactaatgt gattaacctat tttttgtg atctctccc  
 30 181 tctcttgaa ctctctgct ccagtaccta catcaatgaa ttactagttc tggcttgag  
 241 tgcattgaat atcctgacgc ctgccttaac tctcctggcc tcttatact tcaccattgc  
 301 cagtatcctc cacattcgt ccaactgaggg cagggtccaaa gccttcagca ctgcagctc  
 361 ccacatctca gctgttgctg tcttcttggt atctgcagca ttcattgacc tgcagccatc  
 421 atctgtcagt tccatggacc aggggaaagt gtcattctgtg ttttacacaa ctgtgtgcc  
 35 481 catgctg (SEQ ID NO:305).

## OR188

LOCUS AF179809 469 bp DNA PRI 31-DEC-2000  
 40 DEFINITION Callithrix jacchus olfactory receptor (CJA199) gene, partial cds.  
 ACCESSION AF179809  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 469)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 469)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 55 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES                      Location/Qualifiers

source                      1..469

                              /organism="Callithrix jacchus"

                              /db\_xref="taxon:9483"

gene                        <1..>469

                              /gene="CJA199"

CDS                        <1..>469

                              /gene="CJA199"

                              /codon\_start=2

                              /product="olfactory receptor"

                              /translation="VAICHPLHYTTVMSRGLCCVLVAASWMGGFVHSTVQTILTIRLP

                              FCGPNQVDNFFCDVPPVIKLACADTFVIELLMVSNGLISTSSFVVLISSTYTTILVKI

                              HSEKERRKALSTCASHLMVVTLFGPCSFYHPFSTFSVDKMVSPLYKVITPML" (SEQ ID

NO:308).

BASE COUNT              91 a 126 c 97 g 155 t

ORIGIN

1 tgttgctatc tgcaccccc tgcactacac cactgtcatg agtcggggat tatgctgtgt

61 gttgggtgct gcctcctgga tgggaggatt tgtgcactcc accgtccaga ccattctcac

121 tatcctgtcg cccctttgtg ggccaaatca ggtggacaac ttttttgtg atgttcccc

181 tgtcatcaaa cttgcctgtg ctgacacttt tgtcattgaa ttgctcatgg tatctaacag

241 tgggtgtatc tcaccagct cctttgtggt gctgatttcc tctacacca ctatcctagt

301 caagattcac tccaaggagg gaaggcgaaa ggcactctcc acatgtgcct ctacccattat

361 ggtggtaaca ctttttgac cctgtagtgt catctatcct catcctttct ctacattttc

421 tgtggacaag atggtgtctg tactctacaa ggttattact ccaatgcta (SEQ ID NO:307).

## OR189

LOCUS AF179810 488 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA201) gene, partial cds.

ACCESSION AF179810

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES                      Location/Qualifiers

source                      1..488

                              /organism="Callithrix jacchus"

                              /db\_xref="taxon:9483"

gene                        <1..>488

                              /gene="CJA201"

CDS                        <1..>488

                              /gene="CJA201"

                              /codon\_start=2

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                    /product="olfactory receptor"
                    /translation="VAICFPLRYMLLSHSICVTMIIVCWSISIAGALILTVFTMHLP
                    YCGPYKINHFFCEVPAVLKLACADTSFNDRDLDFILGFILLVPLSLILASYVFIFASI
                    FRIRSAQGRKLSFSTCASHVTVVTMFYGPAlIMYMRPGSWYDPERDKKLALFYNVVSG
5                     FL" (SEQ ID NO:310).
BASE COUNT      84 a   145 c   105 g   154 t
ORIGIN
    1 cgttgccatt tgcctcccc ttcgtatat gctactcatg agccattcca ttgtgtcac
    61 gatgattata gttgttggt ccattagcat agctggggcc ctgaccca ctgtctcac
10   121 catgcatctg ccttattgtg gccctacaa gataaacac ttctctgtg aggtccctgc
    181 tgcctgaag ttggcctgtg cagacacatc tttaatgac aggtggact tcattctggg
    241 ttcatcctg ctttggctc cactctccct cactctggcc ttctactct tcattctgc
    301 ctctatctc agaatccgt cagcgcagg gaggtcaag tcctctcca cgtgtgttc
    361 ccacgtact gtgtcacca tgtctatgg gccggccatc atcatgtaca tgaggcccg
15   421 ttcttggtat gaccagagc gggacaagaa gctagcgtg ttctacaatg tggctctgg
    481 ctctctca (SEQ ID NO:309).

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## OR190

```

20  LOCUS   AF179811  487 bp  DNA      PRI    31-DEC-2000
     DEFINITION  Callithrix jacchus olfactory receptor (CJA202) gene, partial cds.
     ACCESSION   AF179811
     KEYWORDS
     SOURCE      Callithrix jacchus.
25  ORGANISM   Callithrix jacchus
           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
           Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
     REFERENCE  1 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
30  TITLE      The olfactory receptor gene repertoire in primates and mouse:
           Evidence for reduction of function in primates
           JOURNAL   Unpublished
     REFERENCE  2 (bases 1 to 487)
           AUTHORS  Giorgi,D.G. and Rouquier,S.P.
35  TITLE      Direct Submission
           JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
     FEATURES   Location/Qualifiers
           source     1..487
40           /organism="Callithrix jacchus"
           /db_xref="taxon:9483"
           gene       <1..>487
           /gene="CJA202"
           CDS        <1..>487
45           /gene="CJA202"
           /codon_start=2
           /product="olfactory receptor"
           /translation="VAICHPLRYTATMNLRLCVQLVAGLWLVTYLHALLHTSLIAHLS
           FCAFNIIHHFFCDLNP LLRLSCSAVSFNVMIHFAVGGLLALTPVCILVFYGLIFSTV
50           LKITSTQGKQRAASTCGCHLSVVVLFYGTAI AVYFSPSSSHTPESDTLSTVMYSVVAP
           ML" (SEQ ID NO:312).
BASE COUNT      86 a   152 c   94 g   155 t
ORIGIN
    1 tgtggcaatt tgccaccct tacgttacac tgccacaatg aacctgcgcc ttgtgtcca
55   61 gctagtggct ggactgtggc ttgtactta cctccatgcc ctctgcata cttccctaat

```

121 agcacatctg tcttctgtg ccttcaatat catccatcat ttcttctgtg atctcaacc  
 181 tctactacgg ctcttctgtg ctgccgtctc cttcaacgta atgatcatt ttgcagtagg  
 241 aggtctattg gctctcacgc ccttctgtg tatcctcgta tttatggac ttatcttctc  
 301 cactgttctg aagatcacct ctactcagg gaaacagaga gctgcttcca cctgcggctg  
 5 361 ccacctgtca gtagtggtgc tgtttatgg cacagccatt gccgtctact ttagccctc  
 421 atctcccat acgctgaga gtgacctct ctcgaccgtc atgtattcag tggggcccc  
 481 gatgctg (SEQ ID NO:311).

## OR191

10 LOCUS AF179812 491 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY110 pseudogene, partial sequence.  
 ACCESSION AF179812  
 KEYWORDS .  
 15 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 491)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 491)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..491  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 gene <1..>491  
 /gene="PPY110"  
 35 /pseudo  
 BASE COUNT 92 a 118 c 105 g 176 t  
 ORIGIN  
 1 cgtggccatc tgtaaccac tgttgtaaac ggtcaccatg tctcccaga tgtgttgc  
 61 cctttcactg ggtgtctatg ggtgggggt tttggggct gtggtcata tgggaaacat  
 40 121 aatgtttatg tcttttgg gagacaacct tgtcaatcac tatctgtgtg acatccttc  
 181 tctccttgag ctctctgca acagctctta cataaattg ctggtggtt ttattattg  
 241 gaccattggc attgggtgc caattgtcac cattttatc tcttatggtt ttattcttc  
 301 cagcattctc cacattagct cacagagggc aggtcaggc taaagcctc agtacctgca  
 361 gtccccat aatttggtg tcgctttct ttgggtcagg tgccttcag tacctcaaac  
 45 421 cactttctt tctaccctg gaccagggga aagtgtctc catttttat actgctgtg  
 481 tgcccatgtt t (SEQ ID NO:313).

## OR192

50 LOCUS AF179813 480 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY111 pseudogene, partial sequence.  
 ACCESSION AF179813  
 KEYWORDS .  
 SOURCE orangutan.  
 55 ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 480)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 480)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..480  
15 /organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>480  
/gene="PPY111"  
/pseudo

20 BASE COUNT 81 a 141 c 100 g 158 t  
ORIGIN  
1 tgtggccatc tgcctccccc tgcactacac catccatcat gagcccatg ctctgtctct  
61 cccttttggc gctgtcctgg gtgctgacca ccttccatgc catgttacac actttactca  
121 tggccaggtt gtgtttttgt gcagacaatg tgatccccc cttttctgt gatatgtctg  
25 181 ctctgctgaa gctgtcctgc tctgacactc gagttaatga attggtgata ttatcatg  
241 gagggctcat tctgtcatc ccattcctac tcaccttgg gtcctatgca cgaattgtct  
301 cctccatcct caagtcctt tctaagggtg tctgcaaggc ctctctact tgtggtctcc  
361 acctctctgt ggtgtccctg ttctatggga cgttagtggt tctctactta tgcccatcgg  
421 ctaatagttc tactctgaag gagactgtca tggctgtaat gtacactgtg gtgaccccca (SEQ ID NO:314).

## OR193

LOCUS AF179814 486 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY112) gene, partial cds.  
35 ACCESSION AF179814  
KEYWORDS  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
40 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
50 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..486  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
55 gene <1..>486

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    /gene="PPY112"
CDS      <1..>486
    /gene="PPY112"
    /codon_start=1
5      /product="olfactory receptor"
    /translation="CAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLARLS
FCADHIISHFFCDLGALLKLSGSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP
ML" (SEQ ID NO:316).
10 BASE COUNT   96 a  147 c   93 g  150 t
    ORIGIN
      1 tgtccatct gtcacctct acattatgcc accatcatga gtcagagcca gtgtgtcatg
      61 ctggtggtg ggtcctgggt catcgcttgt gcgtgtgctc tttgcatac cctcctctg
      121 gcccggttt ccttctgtgc tgaccacatc atctctact tcttctgtga ccttggtgcc
15      181 ctgctcaagc tgcctgctc agacacctcc ctcaatcagt tagcaatctt tacagcagga
      241 ttgacagcca ttatgcttc attcctgtgc atcctgggtt cttatgtgca cattggggtc
      301 accatcctcc agattccctc caccaagggc atatgcaaag ccttggtccac ttgtggatcc
      361 cacctctcag tggtgactat ctattatggg acaattattg gtctctattt tctaccccca
      421 tccagcaaca ccaatgacaa gaacataatt gcttcagtga tatacacagt agtcactccc
20      481 atgttg (SEQ ID NO:315).

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## OR194

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LOCUS   AF179815   487 bp   DNA       PRI    31-DEC-2000
25  DEFINITION   Pongo pygmaeus PPY113 pseudogene, partial sequence.
    ACCESSION   AF179815
    KEYWORDS    .
    SOURCE      orangutan.
    ORGANISM    Pongo pygmaeus
30      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
      Eutheria; Primates; Catarrhini; Hominidae; Pongo.
    REFERENCE   1 (bases 1 to 487)
    AUTHORS     Giorgi,D.G. and Rouquier,S.P.
    TITLE       The olfactory receptor gene repertoire in primates and mouse:
35      Evidence for reduction of function in primates
    JOURNAL      Unpublished
    REFERENCE   2 (bases 1 to 487)
    AUTHORS     Giorgi,D.G. and Rouquier,S.P.
    TITLE       Direct Submission
40      JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
      1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
    FEATURES     Location/Qualifiers
      source     1..487
      /organism="Pongo pygmaeus"
45      /db_xref="taxon:9600"
      gene       <1..>487
      /gene="PPY113"
      /pseudo
    BASE COUNT   107 a  130 c   95 g  155 t
50    ORIGIN
      1 cactgccatt tgccaccctc taagataaac caatctcatg agacccaaaa tttgtggact
      61 tatgactgcc ttctctgga tcttgggctc tacggatgga atcattgatg ctgcagcgac
      121 atttccctc tctactgtg ggtctcggga aatagccac ttctctgtg agttccctc
      181 catactaac ctctcatgca atgacacatc aatattgaa aaggtcttt tcatctgctg
55      241 tatagtaat attgttttc ctgttgcaat catcatcgct tcctatgctc aagtattct

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301 ggctgtcatt cacatgggat ctggagaggg tcgtcggata gctttcacga cctgttcctc  
 361 tcacctcatg gtggtgggaa tgtactatgg agcagctttg ttcatgtaca tacggccac  
 421 atctgatgc tccctacac aggacaagat ggtgtctgta ttctacacca tctcactcc  
 481 catgctg (SEQ ID NO:317).

5

## OR195

LOCUS AF179816 484 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY114) gene, partial cds.

10 ACCESSION AF179816

KEYWORDS .

SOURCE orangutan.

ORGANISM Pongo pygmaeus

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..484

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

30 gene <1..>484

/gene="PPY114"

CDS <1..>484

/gene="PPY114"

/codon\_start=2

35 /product="olfactory receptor"

/translation="VAICFPLHYTAIMSPMLCLSLVALSWVLTTFHAMLHTLLMARLC

FCADNVIPHHFFCDMSALLKLSCSDTRVNELVIFIMGGLILVIPFLILGSYARIVSSI

LKVPKGIKAFSTCGSHLSVVSFLFYGTVSGLYLCPSANSSTLKETVMAVMTVVTPM

L" (SEQ ID NO:319).

40 BASE COUNT 80 a 142 c 105 g 157 t

ORIGIN

1 tgtggccatc tgttccccc tgactacac cgccatcatg agccccatgc tctgtctctc

61 cctgggtggc gtgtcctggg tgctgaccac cttccatgcc atgttacaca ctttactcat

121 ggccaggttg tgtttttgtg cagacaatgt gatccccac ttttctgtg atatgtctgc

45 181 tctgtctgaag ctgtcctgct ctgacctcg agttaatgaa ttggtgatat ttatcatggg

241 agggctcatt cttgtcatcc cattcctact catccttggg tcctatgcac gaattgtctc

301 ctccatcctc aaggctccct ctaagggtat ctgcaaggcc ttctctactt gtggctccca

361 cctctctgtg gtgtccctgt tctatgggac cgtagtggt ctctacttat gcccatcggc

421 taatagtctt actctgaagg agactgtcat ggctgtaatg tacactgtgg tgacccccat

50 481 gctg (SEQ ID NO:318).



## OR196

LOCUS AF179817 483 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY115) gene, partial cds.  
5 ACCESSION AF179817  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 483)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 483)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
20 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..483  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
25 gene <1..>483  
/gene="PPY115"  
CDS <1..>483  
/gene="PPY115"  
/codon\_start=1  
30 /product="olfactory receptor"  
/translation="VAVCHPLHYTLIMHGGLCLGLVAGCLVAGFMNSLMETIITFQLL  
LCHNVINHFACE TLAVLRLACVDVSFNKAMVAISGFLVILLPCSLJLFSYAHIVAAIL  
HIPSAQGRRKAFGTCTSHLTVVCMCFGATMFTYMRPAGGSSLEKKNMVALFYAIVIPM  
L" (SEQ ID NO:321).  
35 BASE COUNT 86 a 136 c 115 g 146 t  
ORIGIN  
1 gtggccgtct gccaccact gcattacacg ctcatcatgc atggagggct gtcctgggg  
61 ctgtggccg gctgcctggt ggctggttc atgaattccc tgatggaac aattatcacc  
121 ttccagcttc tctgtgtca caatgttatt aatcactttg cctgtgagac ctagcagtg  
40 181 ctacgactag cctgtgtgga cgtctccttc aacaaggcca tgggtggccat ctcagggttt  
241 ctggtgatcc tgcttccctg ttactgatc ctattctcct atgctcacat agttgctgcc  
301 attctcata ttcttctgc ccaggacgc cgcaaagcct ttgggacttg cacgtctcac  
361 ctactgtgg ttgcatgtg ctttggggct acaatgttca cctacatgag acctgcgggc  
421 ggctctctcc tggaaaagaa gaatatggtt gccctcttti atgccattgt gattccaatg  
45 481 ctt (SEQ ID NO:320).

## OR197

LOCUS AF179818 484 bp DNA PRI 31-DEC-2000  
50 DEFINITION Pongo pygmaeus olfactory receptor (PPY116) gene, partial cds.  
ACCESSION AF179818  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
5 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
/organism="Pongo pygmaeus"  
15 /db\_xref="taxon:9600"  
gene <1..>484  
/gene="PPY116"  
CDS <1..>484  
20 /gene="PPY116"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAVCHPLHYTLIMHGGLCLGLVAGCLVAGFMNSLMETIITFQLP  
LCHNVINHFACE TLAVRLACVDVSFNKATVAISGFLVILLPCSLILFSYAHIVAAIL  
RIPSAQGHRKAFGTCTSHLTVVCMCFGATMFTYMRPAGGSSLEKENMVALFYAIVIPM  
25 L" (SEQ ID NO:323).  
BASE COUNT 85 a 138 c 116 g 145 t  
ORIGIN  
1 tgtggccgctg tgcacccac tgcattacac gctcatcatg catggagggc tgtgcctggg  
61 gctggtggcc ggctgcctgg tggctggtt catgaattcc ctgatggaaa caattatcac  
30 121 ctccagctt cccctgtgtc acaatgttat taactacttt gcctgtgaga ccttagcagt  
181 gctacgacta gcctgtgtgg acgtctcctt caacaaggcc acggtggcca tctcagggtt  
241 tctggtgatc ctgcttcctt gttaactgat cctattctcc tatgctcaca tagttgctgc  
301 cattcttctg attccttctg cccaggggaca ccgcaaagcc ttggggacct gcacgtctca  
361 cctcactgtg gttgcatgt gctttggggc tacaatgttc acctacatga gacctgcggg  
35 421 tggctctccc ctggaaaagg agaatatggt tgccctcttt tatgccattg tgattccaat  
481 gctt (SEQ ID NO:322).

## OR198

40 LOCUS AF179819 479 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus PPY117 pseudogene, partial sequence.  
ACCESSION AF179819  
KEYWORDS .  
SOURCE orangutan.  
45 ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 479)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 479)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
55 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

5 source 1..479  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"

gene <1..>479  
/gene="PPY117"  
/pseudo

10 BASE COUNT 100 a 115 c 91 g 173 t

ORIGIN

1 tgtagccata tgcaaacct tatactatgt ggtcatcatg agccgaagga cacgcactgt  
61 cttggaatg atctcctggg ctgtgggctt ggtgcacaca ttaagccagt tatcatttac  
121 ttggaacctg cttttttgt ggacctaag tagtagacag cttttttgt gatcttctc  
15 181 gaggtaacaa actgcctgc ctggactctt acctcattga aatactaatt gtggtaata  
241 gtggagtct ttcctaagc actttctgtc tcttggtcag ctctacatc attattcttg  
301 ttatggtttg gctcaagtct tcggctgcaa tggcgaaggc attttctacg ctggcttccc  
361 atattgcagt agtaataatta ttcttggac ctgcatctt catctatgtg tggcccttta  
421 ccactatcc tttgataaa cttcttgcca tattttacac tgtttcacc cccatccta (SEQ ID NO:324).

20

**OR199**

LOCUS AF179820 487 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY118) gene, partial cds.

25 ACCESSION AF179820

KEYWORDS .

SOURCE orangutan.

ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
30 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

35 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
40 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"

45 gene <1..>487  
/gene="PPY118"

CDS <1..>487  
/gene="PPY118"  
/codon\_start=2  
50 /product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLARLS  
FCADHIISHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVYIYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:326).

55 BASE COUNT 95 a 147 c 94 g 151 t

## ORIGIN

1 tgtggccatc tgtcacctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtgct gggtcctggg tcacgcttg tgcgtgtgct ctttgcata cctcctctt  
121 ggcccggtt tcttctgtg ctgaccacat catctctcac ttctctgtg acctgggtg  
5 181 cctgctcaag ctgtcctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg  
241 attgacagcc attatgcttc cattcctgtg catcctggtt tcttatggtc acattggggt  
301 caccatctc cagattccct ccaccaaggg catatgcaa gcctgtcca ctgtgggatc  
361 ccaccttca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
10 481 catgttg (SEQ ID NO:325).

## OR200

LOCUS AF179821 475 bp DNA PRI 31-DEC-2000  
15 DEFINITION Pongo pygmaeus PPY119 pseudogene, partial sequence.  
ACCESSION AF179821  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 475)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
25 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 475)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
30 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..475  
/organism="Pongo pygmaeus"  
35 /db\_xref="taxon:9600"  
gene <1..>475  
/gene="PPY119"  
/pseudo  
BASE COUNT 98 a 119 c 104 g 154 t  
40 ORIGIN

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61 ccagtggtag gctcttgggt cattgggggt atgcactccc tgagccagtt agctttcact  
121 gtaagcttgc cttctgtgg cccaacata gtggacagtt attattgca ccttactttg  
181 gtcacaaac gtgcctgtac agatgcttat atccctgaag tgttgatgct ttggacggt  
45 241 ggtcttatgg gggtgacat tttgcttti gctgatctcc tacacggta tctgattac  
301 tgtgcagcga cattcctcag caggtatggc caaggctcac agcactctga ctgccacat  
361 tgctgtggg accgtgtct tgggccctg tatctcatc tatgcctggc ctttcagcaa  
421 ctaccagtg gataacattt tgctgtatt ctctgtagtt ttacaccta tatta (SEQ ID NO:327).

## OR201

LOCUS AF179822 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY120) gene, partial cds.  
ACCESSION AF179822  
55 KEYWORDS .

SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.

5 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

15 FEATURES Location/Qualifiers  
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         /db\_xref="taxon:9600"  
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         /gene="PPY120"  
     CDS <1..>487  
         /gene="PPY120"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICHPLHYATTMSQSQCVMLVAGSWVIACACALLHTLLLARLS  
         FCADHIIHPFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
         LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
         ML" (SEQ ID NO:329).

20  
 25  
 30  
 35  
 40

BASE COUNT 95 a 150 c 94 g 148 t

ORIGIN  
     1 tgtggccatc tgtcacctc tacattatgc caccacatg agtcagagcc agtgtgtcat  
     61 gctggtgctt ggtcctggg tcacgcttg tgcgtgtgct ctttgcata ccctcctct  
     121 ggcccggtt tccttctgtg ctgaccacat catccctcac ttctctgcg accttggtgc  
     181 cctgtcaag ctgtcctgct cagacacctc cctcaatcag ttgcaatct ttacagcagg  
     241 attgacagcc attatgcttc catcctgtg catcctggtt tcttatggtc acattggggt  
     301 caccatcctc cagattccct ccaccaaggc catatgcaaa gccttgcca cttgtggatc  
     361 ccacctcga gtgtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
     421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
     481 catgttg (SEQ ID NO:328).

## OR202

LOCUS AF179823 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC184) gene, partial cds.

45 ACCESSION AF179823  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

50 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates

55 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 5 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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     CDS <1..>487  
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         LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSIDKDVIVALMYTVVTP  
         ML" (SEQ ID NO:331).  
 20 BASE COUNT 88 a 142 c 106 g 151 t  
 ORIGIN  
     1 tgttgccata tgttacccctc tccactacac tgccatcatg agggaagggc tctgtgcctt  
     61 cttagtggct gtatcttggga ttcatcttg tgctagctcc ctctctcaca cccttctgct  
     121 gaccccgctg cctttctgtg atgcaaacac cgccaccac ttcttctgtg accttgctgc  
 25 181 cctgtcgaag ctgtcctgct cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
     241 ggtggtggc attaccctgc cattcatgtg taccctggta tcatatggct acactggggc  
     301 cactatcctg agggccctt caaccaaagg gatccgcaa gcgttgcca tgtgtggctc  
     361 ccgtctctc gtggtgtctc tgtattatgg ctcaatatt ggccagtacc ttcccaac  
     421 tgaagcagt tccattgaca aggatgtcat tgtggctcta atgtacacag tggcacacc  
 30 481 catgtg (SEQ ID NO:330).

## OR203

LOCUS AF179824 488 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Saimiri sciureus olfactory receptor (SSC185) gene, partial cds.  
 ACCESSION AF179824  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..488  
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 55 /db\_xref="taxon:9521"

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CDS       <1..>488
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5          /codon_start=2
          /product="olfactory receptor"
          /translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLTPLS
          FCDANTVHHYFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYTGATI
          LRV PSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP
10         ML" (SEQ ID NO:333).
BASE COUNT 89 a 142 c 106 g 151 t
ORIGIN
1   ttgtgccata tgttacctc tccactacac tgccatcatg aggggaagggc tctgtgcctt
61   cttagtggt gtatcttga ttccatcttg tgctagctcc ctctctcaca ccttctgct
15  121   gaccccgctg tcttctgtg atgcaaacac cgtccaccac tacttctgtg accttgctgc
181   cctgctcaag ctgtcctgct cagatatctt cctcaacgag ctggcatgt tcacagtagg
241   ggtgggtgc attacctgc cattcatgtg taccctgga tcatatggct acactggggc
301   cactatcctg aggggtccct caaccaaagg gatccgcaaa gcgttgcca tgtgtggctc
361   ccgtctctct gtggtgtctc tgtattatgg ctcaatatt ggccagtacc tttcccaac
20  421   tgtaagcagt tccattgaca aggatgtcat tgtggtccta atgtacacag tggtcacacc
481   catgctgt (SEQ ID NO:332).

OR204

25  LOCUS   AF179825  487 bp  DNA      PRI    31-DEC-2000
      DEFINITION Saimiri sciureus olfactory receptor (SSC186) gene, partial cds.
      ACCESSION  AF179825
      KEYWORDS
      SOURCE    common squirrel monkey.
30  ORGANISM Saimiri sciureus
      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
      Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.
      REFERENCE 1 (bases 1 to 487)
      AUTHORS   Giorgi,D.G. and Rouquier,S.P.
35  TITLE    The olfactory receptor gene repertoire in primates and mouse:
      Evidence for reduction of function in primates
      JOURNAL    Unpublished
      REFERENCE 2 (bases 1 to 487)
      AUTHORS   Giorgi,D.G. and Rouquier,S.P.
40  TITLE    Direct Submission
      JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
      1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
      FEATURES   Location/Qualifiers
      source     1..487
45          /organism="Saimiri sciureus"
          /db_xref="taxon:9521"
      gene      <1..>487
          /gene="SSC186"
      CDS       <1..>487
50          /gene="SSC186"
          /codon_start=2
          /product="olfactory receptor"
          /translation="VATCHPLRYMVMNPCLCSLLILLSPLTSVVNALLSLMVLRLS
          FCTDLEIPLFFCELAQVIQLACSDTLINNILIYFAACIFGGVPLSGIIFSQAQIASSI
55  LRMP SARRKYKAFSTCGSHLSMVLFFYRTGLGVYISSAVTDSPRKTAVASMMYSVGPQ

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MV" (SEQ ID NO:335).  
 BASE COUNT 92 a 126 c 105 g 164 t  
 ORIGIN  
 1 tgtggccact tgtaccccc ttagatacat ggtcatcatg aacccctgcc tctgcagcct  
 5 61 gctgattctt ctttcccg tgactagcgt tgtgaatgcc cttcttctca gcctgatggt  
 121 gttgaggctg tccttctgca cagatctgga aatcccgcgc ttcttctgtg aactggctca  
 181 ggtcatccag cttgcttctt ctgacaccct catcaataac atcctgatat atttgcagc  
 241 ttgcatattt ggtgggtgtc ctcgtctgtg aatcatattc tcttatgctc agattgcctc  
 301 ctctattttg agaatgccat cagcacgcag aaagtataaa gcctttcca cctgtgggtc  
 10 361 tcaccttcc atggtgctct tgtctatag gacagggttg ggggtgtaca ttagtctgc  
 421 agttactgac tcacctagga agactgcagt ggcttcaatg atgtattctg tgggtcctca  
 481 aatggtg (SEQ ID NO:334).  
**OR205**  
 15 LOCUS AF179826 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC187) gene, partial cds.  
 ACCESSION AF179826  
 KEYWORDS .  
 20 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 35 source 1..487  
 /organism="Saimiri sciureus"  
 /db\_xref="taxon:9521"  
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 /gene="SSC187"  
 40 CDS <1..>487  
 /gene="SSC187"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICLPLHYATIMSPMLSRSLVALSWVLTTFHAMLHTLLMARLR  
 45 FCADNVILHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI  
 LKVPSSKGICKAVSTCGSHLSVVSIFYGTVIGLYLCPSANNSTLKETVMAVMYTVMAP  
 ML" (SEQ ID NO:337).  
 BASE COUNT 84 a 140 c 104 g 159 t  
 ORIGIN  
 50 1 cgtggccatc tgctccccc tacattacgc caccatcatg agcccatgc tgtctcgtc  
 61 cctgggtggc ctgctctggg tgcagaccac cttccatgcc atgttcaca ctttactcat  
 121 ggccagggtg cgtttttgtg cagacaatgt gatcctccac ttttctgtg atatgtctgc  
 181 tctgctgaag ctggcctgct ctgacactcg agttaatgaa ttggtgatat ttatcatggg  
 241 aggcctcatt cttgcatcc catttctact tatcattggg tcctacgcac gaattgtctt  
 55 301 ctccatcctc aaggctcctt cttctaaggg tatctgcaag gccgtctcta cttgtggctc



361 ccacctctct gtggtgtcac tgttctatgg gactgttatt ggtctctact tatgcccac  
 421 agctaataa tctactctaa aggagactgt catggctgtg atgtacactg tgaaggcccc  
 481 catgctg (SEQ ID NO:336).

## 5 OR206

LOCUS AF179827 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC190) gene, partial cds.  
 ACCESSION AF179827  
 10 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 15 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 20 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 25 FEATURES Location/Qualifiers  
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 30 /gene="SSC190"  
 CDS <1..>487  
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 /product="olfactory receptor"  
 35 /translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIIFPPLLGLNLD  
 FCASNVDHFYFDTIPLLQISCTDTQLLERMGFISALVTLVTLVMVIISYTYIALTI  
 LKIPSTSQRKKAFTSCSSHMIVISLSYGSCIFMYVKPSVKQRVSFSGKISVLNTSVAP  
 LL" (SEQ ID NO:339).  
 BASE COUNT 112 a 124 c 91 g 160 t  
 40 ORIGIN  
 1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
 61 gcttgtgctt ggggtctggg ttcttggttt tctcatcatc ttccaccac tcctcttagg  
 121 actaaatctt gacttctgtg cctccaacgt cgttgatcat ttctacttg acactatccc  
 181 gctcctgcag atttctgca cagacacgca gctcctggag aggatgggat tcattcagc  
 45 241 gtggtgaca ctcttagtca cattggaat ggtgataata tcatactt atattgccct  
 301 gacaattcta aaaatccctt caactagtca gaggaanaag gcttttcca cgtgtcttc  
 361 tcacatgatt gtgatatccc ttcttatgg cagctgcac ttcatgtatg ttaagccatc  
 421 agtcaacaaa agggatctt ttcaaggga aatttcggtg ctcaatacct ctgttgctcc  
 481 acttttg (SEQ ID NO:338).

## 50 OR207

LOCUS AF179828 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC191) gene, partial cds.  
 55 ACCESSION AF179828

KEYWORDS .  
SOURCE common squirrel monkey.  
ORGANISM Saimiri sciureus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 485)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 485)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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CDS <1..>485  
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/product="olfactory receptor"  
/translation="VAICHPLQYSVIMTTGYCGQLVAFSYMSGFMISVIKVVYFISHVA  
FCGSNVMNHFFCDISPVLKLACKDMSTAELVDFALAIVILVIPLITTILSYIYIVSAI  
LHIPSTQGRKKAFTCASHLTVVIIFYTAMIFTYVRPRAIASFNSNKLMSAVYAVLTP  
ML" (SEQ ID NO:341).  
BASE COUNT 111 a 134 c 80 g 160 t  
ORIGIN  
1 gtggccattt gccaccctct tcaatactca gtcacatga ccacaggta ctgtggacag  
61 ctgtggcctt tctctacat gagtggtttc atgatctctg tcatcaaggt ctatttcatt  
121 tcacatgttg ctttctgtgg ctccaatgtt atgaaccact ttttctgtga tatctcacca  
181 gtccctaaac tggcatgcaa agacatgtcc acagctgagc tagtggactt tgcttagct  
241 atcgtcattc ttgtgatccc tctcattacc actatcctct cctatatcta cattgtctcc  
301 gccattctgc atataccctc caccagggga aggaagaagg ccttctccac ctgtgcatct  
361 cactctactg tagtcataat ttttacaca gccatgattt ttacatatgt tcggcccaga  
421 gctattgcac catttaattc caacaaacta atgtcagctg tgtatgcagt cctcacaccc  
481 atgct (SEQ ID NO:340).

## OR208

LOCUS AF179829 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC192) gene, partial cds.  
ACCESSION AF179829  
KEYWORDS .  
SOURCE common squirrel monkey.  
ORGANISM Saimiri sciureus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/gene="SSC192"  
CDS <1..>487  
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FCDANTVHHFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMILVSYGYTGATI  
LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP  
20 ML" (SEQ ID NO:343).  
BASE COUNT 88 a 141 c 106 g 152 t  
ORIGIN  
1 tgttgccata tgttacccct tccactacac tgccatcatg aggggaagggc tctgtgcctt  
61 cttagtggct gtatcttggga ttccatcttg tgctagctcc ctctctcaca cccttctgct  
25 121 gaccccgctg tcttctgtg atgcaaacac cgtccaccac ttcttctgtg accttgctgc  
181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
241 ggtggtggct attaccctgc cattcatgtg tatcctggta tcatatggct acactggggc  
301 cactatcctg agggtcctt caaccaaagg gatccgcaaa gcgttgcca tgtgtggctc  
361 ccgtctctct gtggtgtctc tgtattatgg ctcaatatt ggccagtacc tttcccaac  
30 421 tgtaagcagt tcattgaca aggatgtcat tgtggctcta atgtacacag tggtcacacc  
481 catgctg (SEQ ID NO:342).

## OR209

35 LOCUS AF179830 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC193) gene, partial cds.  
ACCESSION AF179830  
KEYWORDS .  
SOURCE common squirrel monkey.  
40 ORGANISM Saimiri sciureus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
55 /organism="Saimiri sciureus"

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CDS       <1..>487
5         /gene="SSC193"
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          /product="olfactory receptor"
          /translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLTPLS
10        FCDANTVHHFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMCILVSYGYTGATI
          LRVPTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALTYTVVTP
          ML" (SEQ ID NO:345).
BASE COUNT  88 a 143 c 106 g 150 t
ORIGIN
15      1 ttgtgccata ttgtaccctc tccactacac tgccatcatg aggggaagggc tctgtgcctt
        61 cttagtggct gtatcttga ttccatcttg tgctagctcc ctcttcaca cccttctgct
        121 gaccccgctg tcttctgtg atgcaaacac cgtccaccac ttcttctgtg accttgcctg
        181 cctgtctcaag ctgtcctgct cagatatctt cctcaatgag ctggatcatgt tcacagtagg
        241 ggtggtggct attaccctgc cattcatgtg tctcctgcta tcatatggct acactggggc
20      301 caccatcctg aggggtccctt caaccaaagg gatccgcaa gcggtgtcca tgtgtggctc
        361 ccgtctctct gtggtgtctc tgtattatgg ctcaatatt ggccagtacc tttcccaac
        421 tgtaagcagt tccattgaca aggatgtcat tgtggctcta acgtacacag tggtcacacc
        481 catgctg (SEQ ID NO:344).

OR210
25      LOCUS  AF179831  486 bp  DNA      PRI    31-DEC-2000
        DEFINITION  Saimiri sciureus olfactory receptor (SSC194) gene, partial cds.
        ACCESSION  AF179831
        KEYWORDS
30      SOURCE   common squirrel monkey.
        ORGANISM  Saimiri sciureus
                Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
                Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.
        REFERENCE  1 (bases 1 to 486)
35      AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE    The olfactory receptor gene repertoire in primates and mouse:
                Evidence for reduction of function in primates
        JOURNAL   Unpublished
        REFERENCE  2 (bases 1 to 486)
40      AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE    Direct Submission
        JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
                1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
        FEATURES   Location/Qualifiers
45      source    1..486
                /organism="Saimiri sciureus"
                /db_xref="taxon:9521"
        gene      <1..>486
                /gene="SSC194"
50      CDS       <1..>486
                /gene="SSC194"
                /codon_start=2
                /product="olfactory receptor"
                /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS
55      FCTDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYKIVSSI

```

RAISSAQGKYKAFSTCASHILIVSLFYGTLGVDYISSAATGNSHSSAAALVMYTVVTP  
ML" (SEQ ID NO:347).

BASE COUNT 102 a 133 c 97 g 154 t

ORIGIN

5 1 tgtggccatc tgcaccccc tgcactacac agtcaccatt aaccccagac tgtgtggact  
61 gctggttctg gcatcctgga tcctgagtc cctgaattcc tcattacaaa ccttaaatg  
121 gctgcggctt tcctctgca cagacttga aatccccac ttttctgcg aactaatca  
181 ggcatacat ctgcctgtt atgacactt ccttaaatgat gtgtgatgt atttgcagc  
241 tatgctgctg ggcgggtggtc ccctcacagg aattatttac tctactcta agatagtctc  
10 301 ctccatcgt gcaatctcat cagctcagg gaagtacaag gcgtttcca cctgtgcatc  
361 tcacatctta attgtctct tatttatgg tacactccta ggtgtgtaca ttagttctgc  
421 tgcaactggc aactcacatt caagtgtgc agccttggtg atgtacactg tggtcacccc  
481 catgct (SEQ ID NO:346).

15 **OR211**

LOCUS AF179832 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC195) gene, partial cds.  
ACCESSION AF179832

20 KEYWORDS .  
SOURCE common squirrel monkey.  
ORGANISM Saimiri sciureus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

25 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

30 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

35 FEATURES Location/Qualifiers  
source 1..487  
/organism="Saimiri sciureus"  
/db\_xref="taxon:9521"  
gene <1..>487  
40 /gene="SSC195"  
CDS <1..>487  
/gene="SSC195"  
/codon\_start=2  
/product="olfactory receptor"  
45 /translation="VAICNPLLYMVTMSPQVCLLLLGVYGMGVLGAVAHMGNIMFMT  
FCSENLVNHYMCDVLPILLESCNSSYINLLLVFIIVAIGIGVPIVTIFISYGFILSSI  
LHISSTEGRSKAFSTCSSHIIIVSLFFGSGAFMYLKPPSILPLDQGVSSIFYTAVVP  
MF" (SEQ ID NO:349).

BASE COUNT 92 a 116 c 105 g 174 t

50 ORIGIN  
1 cgtggccatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tgtgttctg  
61 ccttttgtt ggtgtctatg ggtgggggt tttgggggt gtggtcata tgggaacat  
121 aatgttatg acctttgtt cagaaaatct tgcaatcac tacatgtgtg atgtccttc  
181 cctcctgag ctctcctgca acagctctta cataaattg ctgttggtt ttattattgt  
55 241 ggccattggc attgggtgc caattgcac cattttatc tcttatggtt ttattctttc

301 cagcattctc cacattagct ccacagaggg caggctctaaa gccttcagta cctgcagctc  
 361 ccacataatt gtcgtatcgc tttctttgg gtcaggagct tttatgtacc tcaaaccacc  
 421 ttctattcta ccctgggacc aggggaaagt gtcctccatt tttatactg cagtgggtgcc  
 481 catgtt (SEQ ID NO:348).

5

## OR212

LOCUS AF179833 486 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis SBO213 pseudogene, partial sequence.

10 ACCESSION AF179833

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

30 gene <1..>486

/gene="SBO213"

/pseudo

BASE COUNT 107 a 151 c 87 g 141 t

ORIGIN

35 1 cgtggccatc tgccaccctc tccactatcc catccgcatg agtagaagtg tgtgtgtgaa  
 61 gatgattgga ggctcttga cgctggggtc catcaactcc ttggcacaca cagtctatgc  
 121 cctccatatt cctactgca ggtctagagc cattgacctt ttctctgcg acatcccage  
 181 catgttgctt ctgcctgta cggacacttg ggtctatgaa tacatgggtt ttctaagtac  
 241 aagctgcctt ctctcttctc ttctctggc atcaccgctt cctatggccg agtcctattt  
 40 301 gctgtctacc atacgcattc aaaaaaggga agaaaaagg cctccaccac cattcaacc  
 361 catttaactg tagtgatctt ttactatgca cctttgtct acacctatct tcggcccagg  
 421 aatctccact caccatccga agacaagatc ctggcagtct tctacacat ccttaccctt  
 481 atgctc (SEQ ID NO:350).

## 45 OR213

LOCUS AF179834 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO214) gene, partial cds.

50 ACCESSION AF179834

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 15 gene <1..>487  
 /gene="SBO214"  
 CDS <1..>487  
 /gene="SBO214"  
 /codon\_start=2  
 /product="olfactory receptor"  
 20 /translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIIFPPLLGLNLD  
 FCASNVDHFYCDTIPLLQISCTDTQLLERMGFISALVTLVTLVMVIISYTYIALTI  
 LKIPSTSQRKKAFSTCSSHMIVISLSYGSCIFMYVKPSVKQRVSFSGKISVLNTSVAP  
 LL" (SEQ ID NO:352).  
 BASE COUNT 112 a 125 c 92 g 158 t  
 25 ORIGIN  
 1 tgtgcccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
 61 gcttgtgctt ggggtgctggg ttcttggttt tctcatcacc ttccaccac tectcttagg  
 121 actaaattct gacttctgtg cctccaacgt cgttgatcat ttctactgtg acactatccc  
 181 gtcctgcag atttctgca cagacacgca gctcctggag aggatgggat tcatctcage  
 30 241 gctggtgaca ctcttagtca cattggtaat ggtgataata tcataactt atattgccct  
 301 gacaattcta aaaatccctt caactagtca gaggaaaaag gcttttcca cgtgttcttc  
 361 tcacatgatt gtgatatccc ttcttatgg cagctgcac ttcatgtatg ttaagccatc  
 421 agtcaaacaa agggatatctt ttcaaaggg aattcggtg ctcaatacct ctgttgctcc  
 481 acctttg (SEQ ID NO:351).  
 35  
**OR214**  
 LOCUS AF179835 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO215) gene, partial cds.  
 40 ACCESSION AF179835  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 55 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..487

                  /organism="Saimiri boliviensis"

                  /db\_xref="taxon:27679"

5            gene            <1..>487

                  /gene="SBO215"

CDS            <1..>487

                  /gene="SBO215"

                  /codon\_start=2

10            /product="olfactory receptor"

                  /translation="VAICFPLHYTLLMSHSICVNTVIVCWSISIAGALIYTVFTLHLP

                  YCGPYKINHFFCEVPAVLKLACADTSFNDRLDFILGFLLLLVP LSFILASYVLIFASI

                  FRIRSVQGR LKSFSTCASHVTVVTMFYGP AII MYMRPGSWYDPEW DKKVEVLYN VISA

                  FL" (SEQ ID NO:354).

15    BASE COUNT    86 a 142 c 104 g 155 t

ORIGIN

                  1 cgttgccatt tgcctccccc ttactatac gctactcatg agccattcca ttgtgtcaa

                  61 cacggtcatt gtctgttggc ccattagcat agctggggcc ctgatctaca ctgtcttcac

                  121 ctgcatctg ccttattgtg gcccctacaa gataaacac ttctctgtg aggtccctgc

20            181 tgcctgaag ttggcctgtg cagacacatc tttaatgac aggctggact tcatttggg

                  241 ttctctctg cttttgtcc cactctctt catcctggcc tcttactac tcactttgc

                  301 ctctatctc agaatccgct cagtgcaggg gaggtcaag tcctctcca cgtgtgcttc

                  361 ccacgtcact gtggtcacca tgttctacgg accggccatc atcatgtaca tgaggcccg

                  421 ttcttggtat gaccagagt gggacaagaa ggtagagggt ttgtacaatg tcactctgc

25            481 cttcttg (SEQ ID NO:353).

## OR215

LOCUS    AF179836    487 bp    DNA            PRI    31-DEC-2000

30    DEFINITION    Saimiri boliviensis olfactory receptor (SBO216) gene, partial cds.

ACCESSION    AF179836

KEYWORDS    .

SOURCE    Bolivian squirrel monkey.

ORGANISM    Saimiri boliviensis

35            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

                  Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE    1 (bases 1 to 487)

AUTHORS    Giorgi,D.G. and Rouquier,S.P.

TITLE    The olfactory receptor gene repertoire in primates and mouse:

40            Evidence for reduction of function in primates

JOURNAL    Unpublished

REFERENCE    2 (bases 1 to 487)

AUTHORS    Giorgi,D.G. and Rouquier,S.P.

TITLE    Direct Submission

45    JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

                  1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES            Location/Qualifiers

source            1..487

                  /organism="Saimiri boliviensis"

50            /db\_xref="taxon:27679"

gene            <1..>487

                  /gene="SBO216"

CDS            <1..>487

                  /gene="SBO216"

55            /codon\_start=2



/product="olfactory receptor"  
 /translation="VAICQPLHYSTLLSPQACMTMVGTSWLTGHIATTHASLIFSLP  
 FPSHPMIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMVPFSMIVTSYIRILGAI  
 LAMTSTQSRHKVFSTCSSHLLVCLFFGTASITYIRPQAGSSVTDRILSLFYTVITP  
 ML" (SEQ ID NO:356).

BASE COUNT 93 a 186 c 89 g 119 t  
 ORIGIN

1 tgttgccatc tgccagcccc tgccactact caccctcttg agcccacagg cctgcatgac  
 61 catggtgggc acctcctggc tcacagccat catcacagcc accacccatg cctccctcat  
 121 cttctctctg cctctcccca gccaccaat gatccacac ttctctgtg acatcctgcc  
 181 agtactgaga ctggcaagtg ctgggaagca caggagttag atctccgtga tgacagctac  
 241 cgtagtcttc atcatggtcc cttctctat gattgtcacc tcttacatcc gcatcctggg  
 301 tgccatccta gcaatgactt ccacccagag ccgccacaag gtctctcca cctgtcctc  
 361 ccatctgctt gtggtctgtc tctcttgg aacagccagc atcacctaca tacggcccca  
 421 ggcaggctcc tctgtacca cagaccgcat cctcagtctc ttctacacgg tcatcacacc  
 481 catgctc (SEQ ID NO:355).

## OR216

20 LOCUS AF179837 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO217) gene, partial cds.  
 ACCESSION AF179837  
 KEYWORDS

SOURCE Bolivian squirrel monkey.  
 25 ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>487  
 /gene="SBO217"  
 45 CDS <1..>487  
 /gene="SBO217"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLYYSTVMSPQVCALILVLCWVLTNVVALTHTLLMARLS  
 FCVTGEIAHFFCDITPVCLKSCSDTHINEMMVFLGGTVLIIPFLCIVTSYIYIVPAI  
 50 LRVTRTHGGAGKAFSTCSSHLICVCFYGTFLFSAYLCPPSIASEDKDIATAAMYTIVTP  
 TL" (SEQ ID NO:358).

BASE COUNT 89 a 151 c 100 g 147 t  
 ORIGIN

1 tgtggccatt tgccaccccc tctactactc cacagtcagt agccccaag tctgtgccct  
 55 61 aatcctcgtg ttgtgctggg tctcaccaa cggtgtgcc ttgaccacac cactcctcat

121 ggctcgactg tccttctgtg tgactgggga aattgctcac ttttctgtg acatcactcc  
 181 tgcctgaag ctatcatgtt ctgacacca catcaatgag atgatggtt ttgtcttggg  
 241 aggacagta ctcatcatcc ctttctatg cattgtcacc tctacatct acattgtgcc  
 301 tgctattctg agggctccgaa cccatggtgg ggcgggcaag gcctttcca cctgcagttc  
 5 361 ccacctctgc attgtttgtg tgtctatgg gaccctctc agtcctacc tgttcctcc  
 421 ctccatgcc tctgaagata aggacattgc aacagctgca atgtatacca tagtgactcc  
 481 cacgttg (SEQ ID NO:357).

## OR217

10 LOCUS AF179838 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO218) gene, partial cds.  
 ACCESSION AF179838  
 KEYWORDS  
 15 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 486)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..486  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>486  
 /gene="SBO218"  
 35 CDS <1..>486  
 /gene="SBO218"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICNPLLYMVTMSPQVCLLLLLGVYGMGVLGAVAHMGNIMFMT  
 40 FCSENLVNHYMCDVLPLELSCNSSYINLLVFIIVAIGIGVPIVTIFISYGFISS  
 LHISSTEGRSKAFSTCSSHIIVVSLFFGSGAFMYLKPPSILPLDQGVSSIFYTAVVP  
 C" (SEQ ID NO:360).  
 BASE COUNT 92 a 114 c 105 g 175 t  
 ORIGIN  
 45 1 cgtggctatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tggcttgct  
 61 ccttttggg ggtgtctatg ggatgggggt ttgggggct gggctcata tgggaaacat  
 121 aatgtttatg acctttgtt cagaaaatct tgtcaatcac tacatgtgtg atgtccttcc  
 181 cctccttgag ctctcctgca acagctctta cataaattg ctgttggtt ttattattgt  
 241 ggccattgac atfggggtgc caattgtcac cattttatc tctatggtt ttattcttc  
 50 301 cagcattctc cacattagct ccacagaggg cagggtctaa gccttcagta cctgcagctc  
 361 ccacataatt gtggtatcgc ttttcttgg gtcaggagct ttatgtacc tcaaaccacc  
 421 ttctattcta cccctggacc aggggaaagt gtcttcatt tttatactg cagtggtgcc  
 481 atgttt (SEQ ID NO:359).

## 55 OR218

LOCUS AF179839 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO219) gene, partial cds.  
 ACCESSION AF179839  
 5 KEYWORDS .  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 10 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 15 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 20 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>487  
 25 /gene="SBO219"  
 CDS <1..>487  
 /gene="SBO219"  
 /codon\_start=2  
 /product="olfactory receptor"  
 30 /translation="VAICHPLQYSVIMTTGYCGQLVAFSYMSGFMISVIKVVYFISHVA  
 FCGSNVMNLFCDISPVLKLACKDMSTAELVDFALAIIVILVIPLITTILSYIYIVSAI  
 LHIPSTQGRKKAFSTCASHLTVVIIFYTAMIFTYVRPRAIASFNSNKLISAVYAVLTP  
 ML" (SEQ ID NO:362).  
 BASE COUNT 111 a 136 c 78 g 162 t  
 35 ORIGIN  
 1 tgtggccatt tgccaccctc ttcaatactc agtcatcatg accacaggtt actgtggaca  
 61 gctgtggctt ttctttaca tgagtgggtt catgatctct gtcacaaagg tctatttcat  
 121 ttacatggtt gctttctgtg gctccaatgt tatgaacctc ttttctgtg atatctcacc  
 181 agtcctaaaa ctggcatgca aagacatgtc cacagctgag ctatgggact ttgctttagc  
 40 241 tatcgtcatt ctgtgatcc ctctcattac cactatectc tcctatatct acattgtctc  
 301 cgccattctg catataccct ccacccaggg aaggaagaag gccttctcca cctgtgcatc  
 361 tcacctcact gtagtcataa ttttttacac agccatgatt ttacatatg ttgcggccag  
 421 agctatttga tcatttaatt ccaacaaact aatctcagct gtctatgcag tcctcacacc  
 481 catgcta (SEQ ID NO:361).  
 45

## OR219

LOCUS AF179840 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis SBO220 pseudogene, partial sequence.  
 50 ACCESSION AF179840  
 KEYWORDS .  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 55 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 5 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..488  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 15 gene <1..>488  
 /gene="SBO220"  
 /pseudo  
 BASE COUNT 112 a 126 c 92 g 158 t  
 ORIGIN  
 20 1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
 61 gcttgtgctt ggggtctggg ttcttggtt tctcatcgc ttccaccac tcctcttagg  
 121 actaaatctt gactctgtg cctccaacgt cgttgatcat ttctactgtg acatatccc  
 181 gtcctctgag atttctgca cagacacgca gtcctggag aggatgggat tcattcagc  
 241 gctggtgaca ctcttagtca cattggtaat ggtgataata tcatatactt atattgcct  
 25 301 gacaattcta aaaatccctt caactagtca gaggaaaaag gcttttcca cgtgttcttc  
 361 tcacatgatt gtgatatccc ttcttatgg cagctgcat ctcatgtat gtaagccat  
 421 cagtcaaca aagggtatct ttttcaaagg gaatttcggt gctcaatacc tctgtgtc  
 481 cacttttg (SEQ ID NO:363).  
 30 **OR220**  
 LOCUS AF179841 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO221) gene, partial cds.  
 ACCESSION AF179841  
 35 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 40 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 45 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 50 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>487  
 55 /gene="SBO221"

CDS <1..>487  
 /gene="SBO221"  
 /codon\_start=2  
 /product="olfactory receptor"  
 5 /translation="VAICLPLHYATIMSPMLSRSLVALSWVLTTFHAMLHTLLIARLR  
 FCADNVIFHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI  
 LKVPSSKGICKAVSTCGSHLSVVSLFYGTVIGLYLCPSSANNSTLKETVMAVMYTVMAP  
 ML" (SEQ ID NO:365).

BASE COUNT 85 a 139 c 103 g 160 t

10 ORIGIN  
 1 cgtgcccac tgctccccc tacattacgc caccatcatg agcccatgc tgtctgctc  
 61 cctgggtggc ctgtctggg tgctgaccac ctccatgcc atgtgcaca ctttactcat  
 121 agccaggttg cgttttttg cagacaatgt gatctccac ttttctgtg atatgtctgc  
 181 tctgctgaag ctggcctgct ctgacactcg agttaatgaa ttggtgatat ttatcatggg  
 15 241 aggcctcatt ctgtcatcc catttctact tatcattggg tctacgcac gaattgtctt  
 301 ctccatcctc aaggtccctt ctctaaggg tatctgcaag gccgtctcta ctgtggctc  
 361 ccacctctct gtggtgtcac tgttctatgg gactgttatt ggtctctact tatgcccatc  
 421 agctaataa tctacttaa aggagactgt catggctgtg atgtacactg tgatggcccc  
 481 catgctg (SEQ ID NO:364).

20 **OR221**

LOCUS AF179842 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO222) gene, partial cds.  
 25 ACCESSION AF179842  
 KEYWORDS .  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 35 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 40 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 45 gene <1..>487  
 /gene="SBO222"  
 CDS <1..>487  
 /gene="SBO222"  
 /codon\_start=2  
 50 /product="olfactory receptor"  
 /translation="VAICNPLLYMVTMSPQVCLLLLGVYGMGVLGAVAHTGNIVFLT  
 FCAGNLVNHYMCDILPILLESCNGSYINVLVIFIVVTIGIGVPIVAIFISYGFILSSN  
 LHISSAEGRSKAFSTCSSHIIAVSLFFGSGAFMYLKPSSVPLDQGVSSLFYTIVVP  
 MF" (SEQ ID NO:367).

55 BASE COUNT 86 a 120 c 105 g 176 t

# ORIGIN

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1  cgtggccatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tgtgttgct
61  cctttgttg ggtgtctatg ggatgggggt ttgggggct gtggctcata caggaatat
121 agtgtttcta acctttgtg caggcaacct tgtaaatcac tacatgtgtg acatccttc
5  181 ccttcttgag ctctcctgca atggctctta cataaatgtt ctggtcatct ttattgtgt
241 gaccattggc attgggggtg ccattgtgc cattttatc tcttatgggt ttattcttc
301 cagcaatctc cacattagtt ctgctgaggg cagggtctaa gccttcagta cctgcagctc
361 ccacataatt gcagtttctc tttcttcgg gtcaggagct ttatgtacc tcaaacctc
421 ttccgtttta cccctggacc aggggaaagt atcctccctg tttatacta ttgtgtgcc
10 481 catgtt (SEQ ID NO:366).

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# OR222

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LOCUS  AF179843  487 bp  DNA      PRI    31-DEC-2000
15  DEFINITION  Saimiri boliviensis olfactory receptor (SBO223) gene, partial cds.
ACCESSION  AF179843
KEYWORDS   .
SOURCE     Bolivian squirrel monkey.
ORGANISM   Saimiri boliviensis
20         Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
         Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.
REFERENCE  1 (bases 1 to 487)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     The olfactory receptor gene repertoire in primates and mouse:
25         Evidence for reduction of function in primates
JOURNAL   Unpublished
REFERENCE  2 (bases 1 to 487)
AUTHORS   Giorgi,D.G. and Rouquier,S.P.
TITLE     Direct Submission
30  JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
FEATURES   Location/Qualifiers
source     1..487
           /organism="Saimiri boliviensis"
35         /db_xref="taxon:27679"
gene       <1..>487
           /gene="SBO223"
CDS        <1..>487
           /gene="SBO223"
40         /codon_start=2
           /product="olfactory receptor"
           /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS
           FCTDLEIPHFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIYYSKIVSSI
           RAISSAQKYGAFSTCASHILIVSLFYGTLGVLSSAATGNSSHSSAAALVMYTVVTP
45         ML" (SEQ ID NO:369).
BASE COUNT  101 a  134 c  98 g  154 t
ORIGIN
1  tgtggccatc tgcaccccc tgactacac agtcaccatt aacccagac tgtgtggact
61  gctggtctg gcactcctga tctgagtgc cctgaattcc tcattacaaa ccttaatatg
50  121 gctgcggctt tcctctgca cagacttga aatccccac ttttctcg aactaatca
181 ggtcacaatc ctgcctgtt atgacactt ccttaatatg gtggtgatgt attggcagc
241 tatgctctg gcggtgtgc ccctcacagg aattatttac tctactcta agatagtctc
301 ctccatactg gcaatctcat cagctcaggg gaagtacaag gcgtttcca cctgtgcac
361 tcacatctta attgtctct tttttatgg tacactccta ggtgtgtacc ttagtctgc
55  421 tgcaactggc aactcacatt caagtgtgc agccttggtg atgtacactg ttgtcacccc

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481 catgctg (SEQ ID NO:368).

## OR223

LOCUS AF073959 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR1-72M15 olfactory receptor gene,  
partial cds.  
ACCESSION AF073959  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1-72M15"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="IADIGFTSTTIPKVLQTIHTQSKFISFSGCITQIFFFIVFGCLD  
NLLLSVMAYDRFVAICHPLHYVVMNSCFVMLALGSWIVSVMSSLPETLTVLRLSFC  
TNMEIPHFFCDLPEVLKLACSDTLVNNIVTYSITIVIAGFPFSGILLSYSKIFSSILR  
IPSAGGKYKAFSTCGSHLLVVFLFYSNGLGVYLSSAATSSSRMSLVASLMYSIVTP" (SEQ ID  
40 NO:371).  
BASE COUNT 139 a 171 c 119 g 220 t  
ORIGIN  
1 catagctgac atcggttca cctccaccac tatccccaag gttctgcaga ctatccacac  
61 acagagcaaa ttcatctctt tctcgggctg catcacacag atattttct tcaattgtgt  
45 121 tggatgcctg gacaatttac tcctatcagt gatggcctat gaccgcttg tggccatctg  
181 ccatcccttg cactatgtgg tcatcatgaa ttcttgcttc tgtgtgatgc tggctcttgg  
241 atcatggata gtcagcgtca tgagttccct acctgagacc ttgactgtgt taagactac  
301 ctctgtaca aacatggaaa ttccacactt ttctgtgat ctccccgaag tcctgaagct  
361 tgcctgttct gacacccttg ttaataacat tgtgacatat tctataacca tagtcatagc  
50 421 tggtttccca ttctctggga ttctattgtc ttattctaag attttctct ccatacctaag  
481 aattctctca gctgggggca agtacaaga cttttctacc tgtgggtctc atcttttgt  
541 ggtcttcta ttctatagca atggcttgg ggtctacac agctctgcag ccacatcatc  
601 ttctagaatg agtctagttg cctcactgat gtacagcata gtcactccc (SEQ ID NO:370).

## OR224

LOCUS AF073960 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR1-72M16 olfactory receptor gene,  
partial cds.

ACCESSION AF073960

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1-72M16"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDFCFSSVTIPKLLQNMQSQVPSIPYAGCLAQMYFFLLFADLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCCLVALSWLLTTVISLSHTLLMARLSFC  
ANNVIPHFFCDMSALLKLACSDIQINKLMIFILGGLVIIVPFLIFSSYARIVSSILK  
VPSSRSIRKAFSTCGSHLSVVSFLFYGTIIIGLYLRPSANNSTIKETVMAVMYTVVTP" (SEQ ID

40 NO:373).

BASE COUNT 129 a 184 c 120 g 216 t

ORIGIN  
1 cttctctgac ttctgctttt cctctgtgac cattcccaa ttgctgcaga acatgcaaag  
61 ccaagtcca tccataccct atgcagggtg cctggcaca atgtactttt tcttgccttt  
45 121 tgcagatctc gagagcttcc tccttgtggc catggcctat gatcgctatg tggccatctg  
181 cttccccta cactatacta gcatcatgag cccaagctg tgtctctgcc tgggtggcact  
241 atcttgcta ctgaccacag tcattctttt gtcacacaca ctgctcatgg ctgggtctc  
301 cttctgtgct aacaatgtga ttctcactt ttctgtgat atgtcagctc ttctgaagt  
361 agcctgctc gacattcaga tcaataagt gatgatatt atctgggag gactgtcat  
50 421 tattgtcca ttctgctga tatttcatc ctatgcacga atagtctct ccaattc  
481 ggtccctct tctagaagca tccgaaggc cttctccacc tgggttccc acctctctg  
541 ggtgtctt ttctatgga caatcattg tctctatta cgtccatcag ctaataatt  
601 aaccattaag gagactgtca tggctgtgat gtacacggtg gtgaccct (SEQ ID NO:372).



## OR225

LOCUS AF073961 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR10M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073961  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR10M"  
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 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE  
 SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWVLTTFHAMLHTLLMARLSFC  
 EDNVIPHFFCDMSALLKLSCSDTHVNELVIFVTGGLILVIPFVLJLVSYARIVSSILK  
 VPSARGIRKAFSTCGSHLSVVSFLFYGAIIGLYLCPADNSTVKETVMAMMYTVVTP" (SEQ ID  
 40 NO:375).  
 BASE COUNT 120 a 185 c 141 g 203 t  
 ORIGIN  
 1 cttctctgat cttctgtttt cctctgtcac aatgcccaaa ttgtgcaga acatgcagag  
 61 ccaggactca tccatcacct atgcaggatg cctgacacaa atgtactttt tcttctctt  
 121 tggagacctt gagagcttcc tcttgtggc catggcctat gaccgctatg tggccatctg  
 181 cttcccccct cattacatga gcatcatgag cccagcctc tgtgtgagtc tggctgtgct  
 241 gtcctgggtg ctgaccactt tccatgccat gctgcatacc ctgctcatgg ccagattgtc  
 301 attctgtgag gacaatgtga tccccactt ttctgtgac atgtctgctc tgctgaagct  
 361 gtcctgctct gacactcacg ttaatgaatt ggtgatatt gtcacaggag gcctgatcct  
 50 421 tgtcattcca ttgtgtctca tcctgtgtc ctatgcacga attgtgtcct ccattctcaa  
 481 ggtcccgctc gctcgaggca tccgtaaagc cttctccacc tgtgggtccc acctgtctgt  
 541 ggtgtcactg ttctatgggg caatcattgg tctgtactta tgtccatcag ctgataactc  
 601 tactgtgaag gaaactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:374).

# OR226

LOCUS AF073962 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR11M olfactory receptor gene,  
partial cds.

ACCESSION AF073962

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR11M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2

35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDPSIPYGGCLAQIFFFMLFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKVCTFLVLLLWILTTPHATMQILLTVRLSFC  
ENNVFLNFFCDIFVLLKLACSDTYVNDLMILIMGGLIIVIPFLLIVISYARIISSTLK  
VPSTQGIHKVFSTCGSHLSVVSIFYGTIIGLYLCPSGNNFSLKGSAMAMMYTVVTP" (SEQ ID

40 NO:377).

BASE COUNT 143 a 160 c 122 g 224 t

ORIGIN

1 ttctctgac ctctgcttt cctctgtcac aatgcccaaa ttgctgcaga atatgcagag  
61 ccaggacca tccatccct atggagggtg cctggcacia atattctct ttatgctttt  
45 121 tggagacatg gaaagcttc ttctgtagc catggcctat gaccgctatg tgcccatctg  
181 ctccctctg cattacta gcatcatgag tctaaggtc tgtactttc tagtgctact  
241 gttgtggata ctgacaacac cacatgccac aatgcaaatt ctgctcacag taagactgtc  
301 ttttgtgag aacaatgtgt ttctcaactt ttctgtgac atattgttc tctaaagct  
361 ggctgtctca gacactatg ttaatgatt gatgatactt atcatggagg ggctcatcat  
50 421 tgttatcca ttctgtctca ttgtatata ctatgcaagg atcatctct ctactcttaa  
481 ggttccatct actcaaggca tccacaaggc ctctctacc tgtgctctc atctgtctgt  
541 ggtgtctctg ttctatggga caattattgg tctctactta tgtccatcag gtaataatt  
601 cagtctaaag gggctctgcca tggctatgat gtacacagtg gtgactccc (SEQ ID NO:376).

## OR227

LOCUS AF073963 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR12M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073963  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR12M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQSQDTSISYAGCLTQMYFLLVFGDLE  
 SILLVVMAYDRYVAVCFPLHYMSIMSPITLCVCLLVLSWVFTVLYSMLHTLLLSRLSFC  
 EDNLIHHFFCDISALLKLACSDIHINELMIFIMGGLVSIIPFLIIVVSYIQIVYSILK  
 ISSAHVLHKIFSTCGSHLSVVSIFYGTIFALYLCPSANNSTVKEISMAMMCTVVTP" (SEQ ID  
 40 NO:379).  
 BASE COUNT 134 a 159 c 122 g 234 t  
 ORIGIN  
 1 cttctctgat cttctgtttt cctctgtcac aatgccaag ttgtacaga acatgcagag  
 61 ccaggacacg tccatctcct atgctggctg tctgacacaa atgtactttt tattggtttt  
 45 121 tggagacctg gagagcatcc ttcttttgg catggcttat gaccggtatg tggctgtctg  
 181 cttccccctt cattacatga gcatcatgag cccacactc tgtgtgtgtc tgctagtgtt  
 241 atcctgggta ttactgtgc tgtattctat gttgcacact ctactcttgt ctagattgtc  
 301 attctgtgag gataacttga tccaccactt ttctgtgac atatctgccc tgctcaagtt  
 361 ggcttgctct gacattcata ttaatgaatt aatgatattt atcatgggag ggcttgtag  
 50 421 catcatccca ttctactca ttgtgtgtc ctatatacaa attgtctact ccattctaaa  
 481 gatttcatct gtcctatgtt tacacaagat cttctccacc tgtgggtccc acctgtctgt  
 541 agtctcactg ttctatggga caattttgc tctctactta tgcctcatcag ctaataactc  
 601 tactgtgaag gagatttcca tggccatgat gtgcacagtg gtgactccc (SEQ ID NO:378).

## OR228

LOCUS AF073964 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR15-71M19 olfactory receptor gene,  
partial cds.

ACCESSION AF073964

KEYWORDS

10 SOURCE western European house mouse.

ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M19"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDIGFISTTIPKMLVNIQTQSKSISYAECITQIYFFMLFGGMD  
ILLLTVMAYDRFVAICHPLHYSVIMNPQLSGLLVLVSWFISFSYSLIQSLLMLRLSFC  
TNQIIKHFYCEYSRALTACSDTLINHILLYILICVLGFIPFSGILYSYCKIVSSILR  
IPSTDGKYKAFSTCGSHLSVVSLFYGTGLGVYLSSDVTSSSGKDVVASVMYTVVTP" (SEQ ID

40 NO:381).

BASE COUNT 153 a 151 c 112 g 233 t

ORIGIN  
1 cttttctgac attggttca tctctacaac taccctaag atgttggtga atatccaaac  
61 acagagcaag tccatctcct atgcagaatg catcaccag attattttt tcatgctctt  
45 121 tggaggcatg gacatacttc tctcaccgt gatgcctat gaccgatttg tggccatctg  
181 tccccccct cactattcag tcattatgaa tccccaaacta agtggcttgc tgggtcttct  
241 atcatggtt attagcttt catattctct gatacagagt ctattgatgc tgcggttgc  
301 ctctgtgaca aatcagataa ttaaacactt ttactgtgaa tattctagag cctcactat  
361 agcctgctca gacacactaa tcaatcatat cttctttat attctgatat gtgtccttgg  
50 421 cttcatccct ttctcaggga tctttatc atactgtaaa attgttctt ctattttgag  
481 aattccatca acagatggaa aatataaagc atttctacc tgtgggtctc atctatcagt  
541 ggtttcttta ttctatggga caggccttgg tgtgtacctt agttctgatg taacttctc  
601 ctctgggaag gacgtggtgg cctcagtaat gtatacagtg gtcaccct (SEQ ID NO:380).

## OR229

5 LOCUS AF073965 643 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR15-71M20 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073965  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 643)  
 15 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 643)  
 20 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
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 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR15-71M20"  
 30 mRNA <1..>643  
 /product="olfactory receptor"  
 CDS <1..>643  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FVDLCFSSVTVPKLLKDLLSAKKTISIEGCLAQVFFVFFPSGTE  
 ACLLSVMAYDRYAAICHPLLYGQVMRNELCVRLVVISWGWASLNATIIVLLAVNLDFC  
 GAQTIHHYTCELPALFPLSCSDISITVVVLLCSSLLHGLGTFIPIFFSYARIVSAILS  
 ISSTTGRSKAFSTCSSHLAAVTLFFGSGFLCYLMPPSGSSLDLLLSLQYSAVTP" (SEQ ID  
 40 NO:383).  
 BASE COUNT 98 a 203 c 142 g 200 t  
 ORIGIN  
 1 gttcgtagat ctctgcttct catccgtcac ggtaccgaaa ctgctgaagg acctcctatc  
 45 61 ggcgaagaaa accatctcaa tagaaggctg cctggctcag gtcttttttg tgtttttcc  
 121 ttctggtact gaagcctgcc tgctctctgt catggcttat gaccgctatg ctgccatctg  
 181 ccatccctcg ctctacggcc aggtgatgag aaatgagttg tgtgtaaggc ttggtgcat  
 241 ctcatggggc gtggcctctc tcaacgcaac catcatctg ctctggctg tcaacctgga  
 301 ctctgtggg gctcaaacca ttaccacta cacctgtgag ctgctgccc tttccctt  
 361 gtctgttcc gatatctcca tcactgtcgt cgctcgtt ttgtccagct tgcgtcatgg  
 50 421 gctgggaacc ttatcccta tcttctctc ctatgccgcg attgtctcg ccatcttgag  
 481 catcagttcc accaccggga ggagcaaggc cttctccacc tgctctccc acctcgtgc  
 541 agtgacctg ttcttgggt ctggcttct ttgctatctc atgccgcctt ctggttctc  
 601 tctggacttg ctctgtcgt tgcagtagag cgcagtcacg ccc (SEQ ID NO:382).

## OR230

LOCUS AF073966 643 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR15-71M21 olfactory receptor gene,  
partial cds.

ACCESSION AF073966

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 643)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 643)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..643  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M21"

30 mRNA <1..>643  
/product="olfactory receptor"

CDS <1..>643  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LVDIFFSSVTIPKMLANHLLGSKAISFGGCMQMYFMISLGNTD  
SYILAAMAYDRAVAISRPLHYATIMSPQLCVLLVAGSWVIANANALPHTLLTARLSFC  
GNKDVANFYCDITPLLQLSCSDIRFNVKMMYLGVGVSFVPLLCIIISYVRVFSTVLRV  
PSTKGFLKALSTCGSHLTVVSLYYGTVMGMYFRPLTSYSLKHALITVMYTAVTP" (SEQ ID

40 NO:385).

BASE COUNT 133 a 171 c 148 g 191 t

ORIGIN

1 cctgttgac atctcttct cctctgtaac tattccaag atgctggcca accatctcct  
61 aggtagcaag gccatctcct ttgggggatg tatggcacag atgtactca tgatcatt  
45 121 gggaacaca gacagtata tactagctgc aatggcatat gaccgagctg tggctatcag  
181 tcgcccgctt cattatgcaa caattatgag tccacaactt tgtgtcctgc tgggtgctgg  
241 gtcctgggtg attgcaaatg ctaatgcact gcccacacc ctactcacag ctgattgtc  
301 cttctgtggc aataaggatg tggccaactt ctactgtgac attacacctt tgcctcagct  
361 gtcctgttct gacatccgct tcaatgtgaa gatgatgtac ctgggggtgg gggtctctc  
50 421 tgtgccactg ctgtgcatca tcattccta tgcctgggtc ttctccacag tcttgcgggt  
481 tccatctacc aagggtcttc tgaaggcctt gtccacctgt ggctctcacc tgacagtgg  
541 gtcctgtat tatgggacag tcattggcat gtattccgg cccctgacca gttacagtct  
601 gaagcatgca ttgataactg tgatgtacac ggcagtgacc cca (SEQ ID NO:384).

## OR231

LOCUS AF073967 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR15-71M24 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073967  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
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 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR15-71M24"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="LVDICFTTVIVPQMLVNLLTQRKTILFAQCLTQMYFFVAFGITD  
 SFLAAMAIDRYVAICNPLHYNTVMSPRRCLLVASWAVSHLHSLTHTILMGRLSFC  
 GPNVIHHFFCDVQPLLTLSCSDTSINELLAFTEGSSVIMSPFILLLSLISIFTRTVLR  
 VPSGEGRYKVFSTCGSHLTVVALFYGTIISVYIRPSSTYSVTKDRVVTVIYTVVTP" (SEQ ID  
 40 NO:387).  
 BASE COUNT 134 a 180 c 128 g 207 t  
 ORIGIN  
 1 cctggtggac atctgcttta ccactgtcat cgtgccacag atgttagtga acttgctgac  
 61 acagagaaag acaatcctct ttgccagtg cctcactcaa atgtattctt ttgtggcttt  
 45 121 tggattaca gacagtttcc tttggctgc gatggccatt gaccgctatg ttgctattg  
 181 caatccgctt cattacaaca cagtcagtag tcccaggcgc tgcgcttgc tgggttgggc  
 241 atcctgggca gtgtccatc ttactccct caccacaca attctcatgg gtcgcctctc  
 301 ttctgtgga ccaatgtca ttcacactt cttttgtgat gtccagccac tgcgacact  
 361 ctctgctct gacacctta tcaatgagct ctggccttc acagagggct ctgttgaat  
 50 421 catgagccct ttatcttat tgtgtctct tatactata ttactcgga ctgttctgag  
 481 ggtcccttca ggggaaggaa ggtacaaagt ttctctacc tgtgggtctc acctcacagt  
 541 ttagcactg ttcatggaa ccataatc aggtacatt cgccctcat ccactactc  
 601 agtgacaaag gaccgagttg tcaactgtcat ctatacagta gtacccca (SEQ ID NO:386).

## OR232

LOCUS AF073968 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR18M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073968  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR18M"  
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 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACL TQMYFFSVFGSLE  
 IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVVCVVVFCWVFIVFYAMFHTLLRLSFC  
 KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLLVISLLLIIVSYVQIVSSILR  
 ISSTRAIHKLFSTCGSHLSVVSFLFYGTIIGLYLCP SANNSTEKETAMSLMYTVVTP" (SEQ ID  
 40 NO:389).  
 BASE COUNT 136 a 155 c 121 g 237 t  
 ORIGIN  
 1 cttctctgat cttctgtttt cctctgtcac aatgcccaag ttgctgcaga acatgcagat  
 45 61 ccaggacaca cccatattcct atgtggcttg tctgacacaa atgtactttt tcagtgtttt  
 121 tggaaagtctg gagatattcc ttctgtagt cctggcctat gaccgctatg tggccatctg  
 181 ttaccctt caatattcca gcatcatgag ccccaatctc tgtgtgtgtg tgggtgtgtt  
 241 ctgctgggta ttattgtgt ttatgccat gtttcacaca ctactcttgg ctagattgtc  
 301 attttgtaag aacaatgtga tcccacactt ttctgtgac atatctgccc ttctgaagtt  
 361 ggcatctct gatgtttata ttaatgaatt aatgatactt atctggggag ggtttcttct  
 50 421 tgtcatctca ctctactca tcattgtatc ctatgtacaa attgtctcct caattttaag  
 481 gatttcttct actcgggcta tccataagct cttctccacc tgtggctcac acctgtctgt  
 541 ggtctcactg ttctatggga caattattgg tctgtactta tgtccatcag ctaataactc  
 601 tactgaaaag gagactgcc a tgcctctgat gtacacagtg gtgactccc (SEQ ID NO:388).



## OR233

LOCUS AF073969 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR1M olfactory receptor gene, partial  
cds.

ACCESSION AF073969

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLLWMLTTSHAMMHTLLAARLSFC  
ENNVILNFFCDLFLVLLKLACSDTYVNELMIFIMSSLLIVIPFLLIVMSYARIASILK  
VPSIQGIYKVFSTCGSHLSVVTFLFYGTIIIGLYLCPSGNNSTVKGTVMAMMYTVVTP" (SEQ ID

40 NO:391).

BASE COUNT 142 a 161 c 123 g 223 t

ORIGIN  
1 cttctctgat ctctgctttt cctctgtcac aatgccccaa ttgctgcaga atatacagag  
61 ccaggaccca tccatccctt atgcaggctg cctggcacia acatactctt ttatggtttt  
45 121 tggagatat gagagcttcc ttcttggtgc catggcctat gaccgctatg tggccatctg  
181 ctccctctg cattacacca gcatcatgag tcccaaactc tgtggtgtc taatgctgct  
241 atttggtgat ctaacaacat cccatgcat gatgcatact ctcttgctag caagattgtc  
301 ttttgtgag aacaatgtga tctcaattt tttctgtgac ctatttgtc tctaaagct  
361 ggcttgctca gacacttatg ttaatgagtt gatgatattt ataagagtt ccctcctcat  
50 421 tgttattcca ttttcttca ttgtcatgic ttatgcaagg atcattgcct ccattcttaa  
481 ggttccatct attcaaggga tctacaaggc ctctccacc tgtggtccc atctgtctgt  
541 ggtgaccttg tttatggga caattattgg tctctactta tgtccatcag gtaataattc  
601 cacagtaaag gggactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:390).

## OR234

LOCUS AF073970 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR21M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073970  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR21M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FADICFTSASIPKMLVNIQTKNKVITYEGCISQVFFILFGVLD  
 NFLLAVMAYDRYVAICHPLHYMVIMNRRRLCGFLVLGSWVTTALNSLLQSSMALRLSFC  
 TDLKIPHFVCELNQLVLLACNDTFPNDMVMYFAAILLGGGPLAGILYSYKIVSSIRA  
 ISSSQGKYKASSTCASHLSVVSLFYSTLLGAYLSSSFTQNSHSTARASVMYSVVTP" (SEQ ID  
 40 NO:393).  
 BASE COUNT 150 a 156 c 122 g 221 t  
 ORIGIN  
 1 cttgcagac atctgcttta cttctgctag catcccaaag atgctagtga atatacagac  
 45 61 aaagaacaag gtgataacct atgaagggtg catttctcaa gtattctttt tcatactatt  
 121 tggagtttta gataactttc ttctagctgt gatggcctat gaccgatatg tggcaatctg  
 181 tcaccctctg cactatatgg tcatcatgaa cgcgcgcctc tgtggatttt tagttttggg  
 241 gtcttgggtc acaacagcat tgaattcctt gctgcagagt tcaatggcac tgcggctgtc  
 301 cttttgtaca gactgaaaa ttcccactt tgtttgtgag cttaatcaac tgggtactact  
 361 tgcctgtaat gacacctttc ctaatgacat ggtgatgtac ttgcagcta tactgctggg  
 50 421 tgggtgtcct cttgctggca tcctttactc ttattctaag atagtttctt ccatacgtgc  
 481 aatctcatca tcacagggga agtataaagc atctccacc tgtgcatccc acctctcagt  
 541 tgtttcatta ttctattcta cactcttggg tgcgtatctt agttctctt ttacacaaa  
 601 ctcacactca actgcacgag catctgttat gtacagtggtg gtcaccccc (SEQ ID NO:392).

## OR235

LOCUS AF073971 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR22M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073971  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR22M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE  
 SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWVLTTFHAMLHTLLMARLSFC  
 EDNVIPYFFCDMSALLKLSCSDTHVNELVIFVTGGLLVIPFVLILVSYARIVSSILK  
 VPSARGIRKAFSTCGSHLSVVSIFYGTIIGLYLCPADNSTVKETVMAMMYTVVTP" (SEQ ID  
 40 NO:395).  
 BASE COUNT 121 a 184 c 140 g 204 t  
 ORIGIN  
 1 cttctctgat cttctgtttt cctctgtcac aatgcccaaa ttgctgcaga acatgcagag  
 61 ccaggactca tccatcacct atgcaggatg cctgacacaa atgtactttt tcttgctctt  
 45 121 tggagacctt gagagcttcc tccttgtggc catggcctat gaccgctatg tggccatctg  
 181 cttccccctt cattacatga gcatcatgag ccccgacctc tgtgtgagtc tgggtctgct  
 241 gtcttgggtg ctgaccactt tccatgccat gctgcatacc ctgctcatgg ccagattgtc  
 301 attctgtgag gacaatgtga tcccctactt tttctgtgac atgtctgctc tgtgaagct  
 361 gtcttgcctt gacactcacg ttaatgaatt ggtgatattt gtcacaggag gctgtatcct  
 50 421 tgtcattcca ttgtgtcga tccttgtgtc ctatgcacga attgtgtcct ccatttcaa  
 481 ggtcccgctt gctcgaggca tccgtaaagc cttctccacc tgtgggtccc acctgtctgt  
 541 ggtgtcactg ttctatggga caatcattgg tctgtactta tgtccatcag ctgataactc  
 601 tactgtgaag gaaactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:394).

## OR236

LOCUS AF073972 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR25M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073972  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR25M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
 SLLLVAMAYDRYVAICFPLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLTRLSTFC  
 KNNVIPHFFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSILK  
 VPSTRGIHKVFSTCGSHLSVVSIFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVIP" (SEQ ID  
 40 NO:397).  
 BASE COUNT 136 a 163 c 118 g 232 t  
 ORIGIN  
 1 cttcactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaaa acatgcagag  
 61 ccaagtatca tccattccct atgcaggctg cttgcacaa atgtacttct tttgtttt  
 45 121 cggtagtggt gagagttac tcctgtgtgc catggcctat gaccgttatg tggccatctg  
 181 cttccctctt cattatacca gaatcatgag cccaaacctc tgtgtgagta tggctgctgt  
 241 gtctctggga ctgacaacat tgtatgccat gttgcacact ttgtcttaa ctaggtgtgc  
 301 tttctgtaa aacaatgtga tccccattt ttctgtgac ctttctgctc tctggaagct  
 361 ggctgctct gatattcaca ttaatgagt aatgataatg ataattggag cactgtgtgt  
 50 421 tatacttcca ttctactca tcatagtgtc ttatgcgcac attgtctct ccaattctca  
 481 agtccctca actcgaggca tccacaaggt ctctccact tgtgggtctc atctgtctgt  
 541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc  
 601 tactgtgaag gatactgtca tgtctatgat gtacactgtg gtgattccc (SEQ ID NO:396).

## OR237

LOCUS AF073973 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR27M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073973  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR27M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
 SLLLVAMAYDRYVAICSPHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLRLSFC  
 KNNVIPHFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSTLK  
 VPSTRGIHKVFSTCGSHLSVVSIFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVTP" (SEQ ID  
 40 NO:399).  
 BASE COUNT 136 a 165 c 117 g 231 t  
 ORIGIN  
 1 cttcactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaaa acatgcagag  
 61 ccaagtatca tccattccct atgcaggctg ccttgacaaa atgtacttct tttgtttt  
 45 121 tggatgatgt gagagtttac tcctgtgtgc catggcctat gaccgttatg tggccatctg  
 181 ctccccctct cattatacca gaatcatgag cccaaacctc tgtgtgagta tgggtgtgct  
 241 gtctctgggca ctgacaacat tgtatgccat gtgtcacact ttgtcttaa ctaggtgtgc  
 301 ttctgtaaa aacaatgtga tcccccaatt ttctgtgac cttctgtctc tcctgaagct  
 361 ggctgtctct gatattcaca ttaatgagtt aatgataatg ataattggag cactgtgtgt  
 50 421 tatacttcca ttctactca tcatagtgtc ttatgcgcac attgtctcct ccactctcaa  
 481 agtcccttca actcgaggca tccacaaggt ctctccact tgtggtctc atctgtctgt  
 541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc  
 601 tactgtgaag gatactgtca tgtctatgat gtacactgtg gtgactccc (SEQ ID NO:398).

## OR238

LOCUS AF073974 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR28M olfactory receptor gene,  
partial cds.

ACCESSION AF073974

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR28M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VVDICYTSSGVPQMLAHFLMEKKTISFALCGTQLFFALTGGTE  
FLLLTAMAYDRYVAVCNPLRYTVVMNPRLCMGLAGVSWFVGVVNSAVETAVTMYLPTC  
GHNVLNVHACETLALVRLACVDITLNQVVILASSVVVLMIPCSLVSLSYAHIVAAIMK  
IRSTQGRRKAFETCASHLTVVMSYGMALFTYLPASTASAEQDKVVVIFYALVTP" (SEQ

40 ID NO:401).

BASE COUNT 119 a 183 c 166 g 181 t

ORIGIN

1 agtgggtggac atctgctaca cctccagtgg ggtcccccag atgctggcac acttctcat  
61 ggagaaaaag accatctctt tgccctatg tgggaccag ctctctttg ctctgactct  
45 121 tgggggaact gagtttctgt tgctgactgc catggcctat gaccgctatg tggctgtctg  
181 taatccatta cggtagacag tggtagatga cccaaggctc tgcattgggc tagcagggtg  
241 ctcttggttt gtgggtgtag ttaattctgc tgtggagaca gcagtcacca tgtaccttcc  
301 cacctgtggg cacaatgtac tcaacctgt ggctgtgag acactggcac tggtcagact  
361 ggctgtgtg gacatcaccc tcaaccaagt ggtgatactg gcttctagt tgggtgtgct  
50 421 gatgataccc tgctctctgg tctctctgct ctatgccac attgtagtgc ccatcatgaa  
481 gatcgttct acccaggagc gccgcaaac ctttgagacc tgtgctccc atctgactgt  
541 ggtctccatg tcttatggga tggccctctt cacttaacct cagcctgcct ccacagcctc  
601 tgctgagcag gacaagggtg tagtgatctt ctatgctttg gtcaccccc (SEQ ID NO:400).

## OR239

LOCUS AF073975 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR29M olfactory receptor gene,  
partial cds.

ACCESSION AF073975

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR29M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2

35 /product="olfactory receptor"  
/translation="FVDLCQSSVIMPKMLEKFVMVKSVISFAECMAQFYLFDFVAVSE  
CHMLAVMAYDRYVAICNPLLYNVTMSYKVCSSWMVVGVSGLICATGETVCLLRLLFC  
KADDINHYFCDLLPLLEQSCSNTFINEILGLSFSSFNTPALITLSSYIFILASILR  
IPSTEGRSKAFSTCSSHILAVAVFFGSLAFMYLQPSSVSSMDQGVSSVFYIVVP" (SEQ ID

40 NO:403).

BASE COUNT 143 a 159 c 130 g 217 t

ORIGIN

1 tttcgttgac ctctgccagt ccagtgtcat catgccccaa atgctggaga aattgtcat  
61 ggtgaagagt gtcatttctt ttgcagaatg catggctcag ttctacttat ttgatgtttt  
45 121 tgctgtttca gactgtcaca tgctggctgt catggcttat gatcgctatg ttgccatctg  
181 taaccctctg ctatataatg ttaccatgtc ttacaaagtg tgttctctga tggtagtggg  
241 ggtgtatagt gtaggcttga ttgtgccac aggggaaaca gtctgcctgc ttgactgct  
301 attctgcaa gctgatgaca taaaccacta ctctgtgat ctttaccac tactggaaca  
361 atcctgttcc aatacattta tcaatgaaat actaggactg tccttcagtt catttaatac  
50 421 tactgtccca gctctgacca tcctcagttc ctacatcttc atcatagcca gcatcctcgg  
481 cattccttcc actgaaggca ggtccaaagc cticagcacc tgcagctccc acatcttggc  
541 tgtgtgtgtc ttcttgggt ctttagcatt catgtacctt cagccatcat cagtcagctc  
601 catggaccaa gggaaagtgt cctctgtgtt ttataccatt gttgtgccc (SEQ ID NO:402).

## OR240

LOCUS AF073976 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR2M olfactory receptor gene, partial  
cds.

ACCESSION AF073976

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR2M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHSMHLTLLLRSLFC  
ENNVIPIHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLVTVSYARISSILK  
VPSTRGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPANNSTLKDTVMSLMYTVVTP" (SEQ ID

40 NO:405).

BASE COUNT 126 a 177 c 123 g 223 t

ORIGIN  
1 cttcactgac ctctgctttt cctctgtcac aatgcccaag ttgctgcaga acatgcagag  
61 ccaagtctct tcaatcccct atgcaggctg cctgacacaa atgtacttct tttgtttt  
45 121 tggagatctt gagagcttcc tcttgtggc catggcctat gaccgatatg tagccatctg  
181 cttccctctt cattacacca gcattatgag ccccaggctc tgtgtgagtc ttgtgctgct  
241 gtcctgggtg ctgaccatgt cccattccat gctgcacact ttgctcttaa ctagggtgtc  
301 tttctgtgaa aacaatgtga tccccattt ttctgtgat ctgtctgctc tgctgaagct  
361 ggctgtctct gatattcaca ttaatgaatt ggtgatattg atcataggag ggctgtgtgt  
50 421 tatacttcca ttctactcgc tcacagtgtc ttatgcacgc atcatctctc ccattctcaa  
481 ggtcccttca actcgaggca tccacaaggt ctctccact tgtggtctc acctgtctgt  
541 ggtgtcactg ttctatggga caattattgg cctctactta tgtccatctg ctaataactc  
601 tactctaaag gacactgtca tgtctctgat gtacactgtg gtaactccc (SEQ ID NO:404).



## OR241

LOCUS AF073977 650 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR3M olfactory receptor gene, partial cds.

ACCESSION AF073977

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia; Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5, France

FEATURES Location/Qualifiers

25 source 1..650  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR3M"

30 mRNA <1..>650  
/product="olfactory receptor"

CDS <1..>650  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=3

35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACL TQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVVFCWVFVIFYAMFHTLLARLSFC  
KNNVIPHFCDISALLKLACSDVYINELMILILGGFLLVTSLLLIIVSYVQIVSSILR  
ISSTRAIHKLFFSTCGSHLSVVSIFYGAIIGLYLCPSANNSTKETAMSLMYTVVTP" (SEQ ID

40 NO:407).

BASE COUNT 135 a 157 c 122 g 236 t

ORIGIN

1 ccttctctga tctctgctt tctctgtca caatgcccaa gttgctgcag aacatgcaga  
61 tccaggacac acccatatcc tatgtggctt gctgcacaca aatgtacttt ttcaagtgtt  
45 121 ttggaagtct ggagatatcc ctctctgtag tcttggccta tgaccgctat gtggccatct  
181 gtttaccctc tcaatattcc agcatcatga gccccaatct ctgtgtgtgt gtgggtggtg  
241 tctgtctggg atttattgtg tttatgccca tgtttcacac actactcttg gctagattgt  
301 cattttgtaa gaacaatgtg atccacact tttctgtga catatctgcc ctctctgaagt  
361 tggcatgctc tgatgttat attaatgaat taatgatact tatctggga gggtttcttc  
50 421 ttgcacctc actcttactc atcattgtat cctatgtaca aattgtctcc tcaattttaa  
481 ggatttcttc tactcgggct atccataagc tcttccac ctgtggctca cacctgtctg  
541 tggctcact gtctatggg gcaattattg gtctgtactt atgtccatca gtaataact  
601 ctactgaaaa ggagactgcc atgtccctga tgtacacagt ggtgactccc (SEQ ID NO:406).

## OR242

LOCUS AF073978 648 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR4M olfactory receptor gene, partial  
cds.

ACCESSION AF073978

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..648  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR4M"

30 mRNA <1..>648  
/product="olfactory receptor"

CDS <1..>648  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVVFCWVFVIFYAMFHTLLARLSFC  
KNNVIPHFCDISALLKLACSDVYINELMILILGGFLLVISLLLIIVSYVQIVSSILR  
ISSTRAIHKLFSTCGSHLSVVSFLFYGTIIGLYLCPANNSTETAMSLMYTVVTP" (SEQ ID

40 NO:409).

BASE COUNT 135 a 154 c 122 g 237 t

ORIGIN  
1 cttctctgat cttctgtttt cctctgtcac aatgcccaag ttgctgcaga acatgcagat  
61 ccaggacaca cccatatacct atgtggcttg tctgacacaa atgtactttt tcagtgtttt  
45 121 tgggagctcg gagatattcc ttctttagt cctggcctat gaccgctatg tggccatctg  
181 ttaccctt caattattca gcatcatgag cccaatctc tgtgtgtgtg tgggtgtgtt  
241 ctgctgggta ttattgtgt ttatgccat gttcacaca ctactcttg ctagattgtc  
301 atttgaag aacaatgtga tccacactt ttctgtgac atatctgcc ttctgaagt  
361 ggcattctct gatgttata ttaatgaatt aatgatactt atctgggag ggtttcttct  
50 421 tgtcatctca ctcttactca tcattgtatc ctatgtacaa attgtctcct caattttaag  
481 gatttctct actcgggcta tccataagct ctctccacc tgtgctcac acctgtctgt  
541 ggtctcactg ttctatggga caattattgg tctgtactta tgcctcatg ctaataactc  
601 tactgaaaag gagactgcca gtccctgat gtacacagtg gtgactcc (SEQ ID NO:408).

## OR243

LOCUS AF073979 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR5M olfactory receptor gene, partial  
 cds.  
 ACCESSION AF073979  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 15 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 20 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR5M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQSQDPSIPYASCLTQMYFFMAFGNME  
 IYLLVVMAYDRYVAICFPLHYTSIMSPKLCVSLVLSWVFTILYSMLHTLLARLSFC  
 EDNVIPHFFCDISALLKLACSDISINELMIFIVGGLDTPVIFLLIVVSYYQIVCSILK  
 FSSTRGIHKVFSTCGSHLSVVSFLFYGTIIGVYICPSANNSTVKETVMSLMYTVVTP" (SEQ ID  
 40 NO:411).  
 BASE COUNT 135 a 171 c 124 g 219 t  
 ORIGIN  
 1 cttctctgat cttctgtttt cctctgtcac aatgccaag ttgctgcaga acatgcagag  
 61 ccaggaccca tccatccct atgccagctg tctgacacaa atgtactttt tcatggttt  
 45 121 tgggaacatg gaaattatc ttcttggt catggcctat gaccgctatg tggccatctg  
 181 cttccctctt cattacacca gcatcatgag ccctaagctc tgtgtgtctc tgggtgttct  
 241 cttctgggta ttaccattc tgtattccat gttacacacc ctactcttg caagattgtc  
 301 attctgtgag gacaatgga tccccactt ttctgtgac atatctgccc tgctcaagtt  
 361 ggctgtctc gacatttcta ttaatgaact aatgatattt atcgtgggag ggcttgatac  
 50 421 tgaatccca tttttactca ttgtgttc ctatgtacaa attgtctgct ccattctaaa  
 481 gttctcatct acacggggca tacacaaggt cttctccacc tgtggtccc acctgtctgt  
 541 ggtctcactg ttctatggga caattattgg tgtctacata tgcccatcag ctaataactc  
 601 tactgtgaag gagactgtca tgcctctgat gtacacagtg gtgacgccc (SEQ ID NO:410).

## OR244

LOCUS AF073980 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR6M olfactory receptor gene, partial  
cds.

ACCESSION AF073980

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR6M"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHSMHLTLLLRSLFC  
ENNVIPHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLVTPYARISSILK  
VPSTRGIHKVFSTCGSHLSVVSLFYGTIIGLYLCPANNSTLKDTVMSLMYTVVTP" (SEQ ID

40 NO:413).

BASE COUNT 126 a 178 c 123 g 222 t

ORIGIN  
1 cttcactgac ctctgctttt cctctgtcac aatgccaag ttgctgcaga acatgcagag  
61 ccaagtctct tcaatcccct atgcaggctg cctgacacaa atgtacttct tttgtttt  
45 121 tggagatctt gagagcttcc tccttggtgc catggcctat gaccgatatg tagccatctg  
181 ctccctctt cattacacca gcattatgag cccaggtc tgtgtgagtc ttgtgctgct  
241 gtctggttg ctgacctgt cccattccat gctgcacact ttgctcttaa ctagggtgtc  
301 ttctgtgaa aacaatgtga tccccattt ttctgtgat ctgtctgctc tgcagaagct  
361 ggctgtctct gatattcaca ttaatgaatt ggtgatattg atcataggag ggcttgtgt  
50 421 tatacttcca ttctactcg tcacagtgcc ttatgcacgc atcatctct ccaattctca  
481 ggtcccttca actcgaggca tccacaaggt ctctccact tgtggtctc acctgtctgt  
541 ggtgtcactg ttctatggga caattattgg cctctactta tgtccatctg ctaataactc  
601 tactctaaag gacactgtca tgtctctgat gtacactgtg gtaactccc (SEQ ID NO:412).

## OR245

LOCUS AF073981 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR7M olfactory receptor gene, partial  
 cds.  
 ACCESSION AF073981  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR7M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
 SLLLVAMAYDRYVAICFPLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLTRLSFC  
 KNNVIPHFFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSILK  
 VPSTRGIHKVFSTCGSHLSAVSLFYGSVIVLYLCPSSNNSTVKDVTMSMMYTVVTP" (SEQ ID  
 40 NO:415).  
 BASE COUNT 136 a 165 c 117 g 231 t  
 ORIGIN  
 1 ctctactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaaa acatgcagag  
 61 ccaagtatca tccattccct atgcaggctg ccttgcaaaa atgtacttct tttgtttt  
 45 121 tggatgatgt gagagcttac tcttgtgtgc catggcctat gaccgttatg tggccatctg  
 181 ctccctctt cattatacca gaatcatgag cccaaacctc tgtgtgagta tgggtgctgt  
 241 gtctgtggga ctgacaacat tgtatgcat gttgcacact ttgtcttaa ctagggtgtc  
 301 ttctgtaaa aacaatgtga tccccattt ttctgtgac ctttctgtc tctgaaagct  
 361 ggctgtctct gatattcaca ttaatgagtt aatgataatg ataattggag cacttctgt  
 50 421 tatacttcca ttctactca tcatagtgtc ttatgcgcac attgtctct ccattctcaa  
 481 agtcccttca actcgaggca tccacaaggt cttctccact tgtgggtctc atctgtctgc  
 541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc  
 601 tactgtgaag gatactctca ttctatgat gtacactgtg gtgactccc (SEQ ID NO:414)

## OR246

LOCUS AF073982 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR8M olfactory receptor gene, partial  
 cds.  
 ACCESSION AF073982  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR8M"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
 SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLLWMLTTSHAMMHTLLAARLSFC  
 ENNVILNFFCDLFVLLKLACSDTYVNELMIFIMSSLLIVPFLIVMSYARIASILK  
 VPSIQGIYKVFSTCGSHLSVVTLYGTIIGLYLCPSGNNSTVKGTVMAMMYTAVTP" (SEQ ID  
 40 NO:417).  
 BASE COUNT 143 a 162 c 123 g 221 t  
 ORIGIN  
 1 cttctctgat ctctgctttt cctctgtcac aatgcccaaa ttgctgcaga atatacagag  
 61 ccaggacca tccatccct atgcaggctg cctggcacia acatacttct ttatggtttt  
 45 121 tggagatat gagagcttc ttctgtggc catggcctat gaccgctatg tggccatctg  
 181 ctccctctg cattacacca gcatcatgag tcccaaactc tgtggtgtc taatgctgct  
 241 attgtggatg ctaacaacat cccatgccat gatgcatact ctcttgcag caagattgtc  
 301 tttttgtgag aacaatgtga tectcaattt ttctgtgac ctattgtac tcttaaagct  
 361 ggcttgctca gacacttatg ttaatgagt gatgataatt ataagagt ccctctcat  
 50 421 tgttatcca ttttctca ttgtcatgic ttatgcaagg atcattgcct ccattcttaa  
 481 ggttcatct attcaaggga tctacaaggt cttctccacc tgtggtccc atctgtctgt  
 541 ggtgacctg tttatggga caattattgg tctctactta tgtccatcag gtaataatc  
 601 cacagtaaag gggactgtca tggccatgat gtacacagcg gtgactccc (SEQ ID NO:416).

## OR247

LOCUS AF073983 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR912-47M4 olfactory receptor gene,  
partial cds.

ACCESSION AF073983

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M4"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2

35 /product="olfactory receptor"  
/translation="FVDICFTSTTVPKMLVNIQTQSKAITYADCISQMSVFLVFAELD  
NFLLA VMAYDRYVAICHPLYTIVVNQHLCLMVLLSWVVSILHAFLQSSIVLQLTFC  
GDVKIPHFFCELNQLSQLTCSDSFSSQLIMNLVPVLLAVISFSSILYSYFKIVSSICS  
ISSVQGKYKAFSTCVSHLSIVSLFYSTGLGVYVSSVVIQSSHSAARASVMYTVVTP" (SEQ ID

40 NO:419).

BASE COUNT 148 a 157 c 118 g 226 t

ORIGIN

1 cttgtggac atctgtttta cctccaccac tgtcccaaag atgtggtaa atatacagac  
61 tcaaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggtttt

45 121 tgcagaattg gacaacttct tcttggtgtg gatggcctat gaccgatatg tggctatctg  
181 tcaccacatta tattacacag tcattgttaa ccaacatctc tgtatactga tggttctgct  
241 gtctctgggt gttagcatcc tacatgcctt cttacagagc tcaattgtgc tacagttgac  
301 cttttgtgga gatgtaaaaa ttcccactt cttctgtgag ctttaaccagc tgtctcaact  
361 cacatgttca gacagctttt caagccaact cataatgaat ctgtacctg ttctattggc

50 421 agtcatttcc ttcagtagta tcctttactc ttatttcaag atagtgtcct ccatatgttc  
481 tatctctca gttcaaggga agtacaaggc attttctaca tgtgtctctc acctttccat  
541 tgtctctcta tttatagta caggccttgg agtgtatgtc agttctgttg tgatccaaag  
601 ctctcactct gctgaagag cctctgtgat gtatactgtg gtcaccccg (SEQ ID NO:418).

## OR248

LOCUS AF073984 646 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR912-47M6 olfactory receptor gene,  
partial cds.

ACCESSION AF073984

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..646  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M6"

30 mRNA <1..>646  
/product="olfactory receptor"

CDS <1..>646  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2

35 /product="olfactory receptor"  
/translation="SVDVCFSSSTTVPKVLAIHILRNQAIISFGCLTQLYFLCVFADMD  
NFLLAVMAYDRFVAICHPLHYTTKMTHQLCAFLVVGSWMVASLNALLHTLLVAQLYFC  
GDNVIPHFFCEVTPLKLSCSDTHLNEMLAVAGLIMLAPFVCILLSYILIACAILK  
ISSTGRWKAFSTCGSHLAVVCLFYGTIISLYFNPSSSHSAGRDMAAAMMYTVVTP" (SEQ ID

40 NO:421).

BASE COUNT 128 a 178 c 133 g 207 t

ORIGIN

1 cttctggat gtagcttct cctccaccac tgcctcaag gtactggcca ttcacatac  
61 aagaaatcaa gccatttctg tctctgggtg cctcacacag ctgtatttct tctgtgtgt  
45 121 tgctgacatg gacaatttcc tgctggctgt gatggcctat gaccgatttg tggccatatg  
181 ccacccttta cactacacaa caaagatgac ccatcagctt tggcctttc ttgtgtgtg  
241 gtcctggatg gtagccagtc tgaatgctct gttgcacaca ctgctcgtgg ctcaactcta  
301 cttctgtggg gacaatgtga tccccactt cttctgtgaa gtgactcccc tgctgaaact  
361 cttctgtcca gacacacatc tcaatgagtt gatgattctt gctgttgag ggctgataat  
50 421 gttagctcca ttgtttgca tcctctgtc ttatatcctt attgcttggt ccatcctgaa  
481 aatctcatcc acaggaagat ggaagcctt ctctacctgt ggctcacact tggctgtgtg  
541 gtgcctcttc tatggcacta tcatatccct gtatttaac cctcatctt ctcactcagc  
601 tgggagggac atggcagctg ccatgatgta cacagtgttg accccc (SEQ ID NO:420).



## OR249

LOCUS AF073985 650 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR912-47M7 olfactory receptor gene,  
partial cds.

ACCESSION AF073985

KEYWORDS .

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..650  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M7"

30 mRNA <1..>650  
/product="olfactory receptor"

CDS <1..>650  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2

35 /product="olfactory receptor"  
/translation="FVDICFTSTTVPKMLVNIQTQSKAITYADCISQMSVFLVFGELD  
NFLLAVMAYDRYVAICHPLYYTFIVNQHLCLMVLLSWVVSILHAFLQSSIVLQLTFC  
GDVRIPHFFCELNQLSQLTCSDSLSSHLIMHLVPVLLGAISFSSILYSYFKIVSSICS  
ISSVQGKYKAFSTCVSHLSIVSLFYSTGLGVYVSSAVVQSSHAARASVMYTVVTH" (SEQ ID

40 NO:423).

BASE COUNT 148 a 159 c 121 g 222 t

ORIGIN

1 cttgtggac atctgtttca cctccaccac tgteccaaag atgctggtaa atatacagac  
61 tcaaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggttt  
45 121 tggagaactg gacaacttct tcttggtctg gatggcctat gaccgatatg tggctatctg  
181 tcaccattg tattacacat tcattgttaa ccaacatctc tgtactatga tgggtctgct  
241 gtcttgggt gtagcatcc tacatgcctt cttacagagc tcaattgtac tacagttgac  
301 cttttgtgga gatgtaagaa ttcccactt cttctgtgag ctttaaccagc tgtctcaact  
361 cacatgttca gacagcttat caagccacct cataatgcat cttgtacctg ttctattggg  
50 421 agccatttcc ttcatagtaga tcctttactc ttatttcaag atagtgtcct ccatatgttc  
481 tatctctca gttcaaggga agtacaaggc atttttaca tgtgtctctc acctttccat  
541 tgatcctta ttttatagta caggccttgg agtgtatgtc agttctgctg tggccaag  
601 ctctcactct gctgcaagag cctctgtgat gtatactgtg gtcacacacg (SEQ ID NO:422).

## OR250

LOCUS AF073986 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR912-47M8 olfactory receptor gene,  
partial cds.

ACCESSION AF073986

KEYWORDS

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M8"

30 mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFTSTTVPKVLVNIQTQSKAITYADCISQMSVFLVFAELD  
NFLAVMAYDRYVAICHPLYYTFIVNQHLCLMVLLSWVVSILHAFLQSSIVLQLTFC  
GDVKIPHFCELNQLSQLTCLDSFSSHLIMNLVPVLLAVISFSSILYSYFKIVSSICS  
ISSVQGGKYKAFSTCVSHLSIVFLFYSTGLGVYVSSAVVQSSHAARASVMYTVVTP" (SEQ ID

40 NO:425).

BASE COUNT 144 a 159 c 120 g 226 t

ORIGIN  
1 cttgtggac atctgttca cctccaccac tgtcccaaag gtgctggtaa atatacagac  
61 tcaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggttt  
45 121 tgcagaattg gacaacttc tctggctgt gatggcctat gaccgatatg tggtatctg  
181 tcaccattg tattacacat tcattgtaa ccaacatctc tgtatactga tggttctgct  
241 gtcttggtt gttagcatcc tacatgcctt cttacagagc tcaattgtgc tacagttgac  
301 cttttgtgga gatgtaaaaa ttcccactt cttctgcgag ctttaaccagc tgtctcaact  
361 cacatgttta gacagctttt caagccacct cataatgaat cttgtacctg ttctattggc  
50 421 agtcatttcc ttcagtagta tcctttactc ttatttcaag atagtgtcct ccatatgtc  
481 tatctectca gttcaaggga agtacaaggc attttctaca tgtgtctctc accttccat  
541 tgtctctta tttatagta caggccttgg agtgtatgc agttctgtg tggtccaaag  
601 ctctcactct gctgcaagag cctctgtgat gtatactgtg gtcaccccg (SEQ ID NO:424).

## OR251

LOCUS AF073987 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR912-47M9 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073987  
 KEYWORDS .  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 20 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR912-47M9"  
 30 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 35 /product="olfactory receptor"  
 /translation="FADLCFSTTTVPQVLVHFLVKRKTISFAGCSTQIVVLLLVGCTE  
 CALLAVMSYDRYVAVCKPLHYSTIMTHWLCVQLAAGSWASGALVSLVDTTFTLRLPYR  
 GNNVINHFFCEPPALLKLASADTYSTEMAIFAMGVVILLAPVSLILTSYWNIISTVIQ  
 MQSGEGRLLKVFSTCGSHLIVVVLFGSAIFAYMRPNSKIMNEKDKMISVFYSAVTP" (SEQ ID  
 40 NO:427).  
 BASE COUNT 141 a 175 c 146 g 187 t  
 ORIGIN  
 1 ctttcagat ctctgcttt ctactaccac agtgccccag gtgctgtgcc acttctcgtt  
 61 gaagaggaag accatttctt ttgtggatg ttctacacag atagtgggtg tgcttctggt  
 45 121 cggatgcaca gagtgtgcac tgctggcagt gatgtctat gaccgatatg tggctgtctg  
 181 caaacctctg cactactcca ccatcatgac aacttgcta tgtgtcagc tggctgcagg  
 241 gtctggggcc agtgggtgcac ttgtgtccct ggtggatacc acattcacat tacgtcttcc  
 301 ttatcgagga aacaatgtca ttaaccactt ttctgtgaa cctcctgccc tctggaagt  
 361 ggcatcggca gatacatata gcacagagat ggcgatcttt gcaatgggtg tggtaatcct  
 50 421 cctagcacct gtctccctca tctcacctc ctactggaac atcatctcca ctgtaatcca  
 481 gatgcagctt ggggaaggaa ggctcaaggc ctctccacc tgtggtccc acctcattgt  
 541 tgtgttctc ttctacggct cagcaatatt tgctacatg agggccaact ctaagataat  
 601 gaatgaaaag gataaaatga ttctgggtgt ctattcagca gtgaccccg (SEQ ID NO:426).

## OR252

LOCUS AF073988 649 bp DNA ROD 12-JUL-1999

5 DEFINITION Mus musculus domesticus clone OR9M olfactory receptor gene, partial  
cds.

ACCESSION AF073988

KEYWORDS

SOURCE western European house mouse.

10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
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JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
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France

FEATURES Location/Qualifiers

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## OR253

LOCUS AF073989 1865 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus clone OR1-72M13 olfactory receptor gene, complete cds.  
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 SOURCE house mouse.  
 ORGANISM Mus musculus  
 10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 1865)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 15 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 1865)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 20 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
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 1861 tgcag (SEQ ID NO:430).

As used herein, the terms “ORX nucleic acid sequence” and/or “ORX nucleic acid molecule” specifically refer to the sequences of GenBank Accession Nos. AF022649,  
 25 AF073959-073989, AF127814-127907, and AF179716-179843.

Likewise, the term “ORX polypeptide” specifically refers to the polypeptide sequences of GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884,  
 30 AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-179811, AF179814, AF179816-179818, AF179820, AF179822-179832,  
 35 AF179834-179839, AF179841-179843, and AF073959-073989.

To sample the ORX genes in primate species, ORX genes were randomly sequenced from anthropoids and prosimians (See FIG. 1). As outlined in Examples 1-3, *infra*, ORX genes were obtained by PCR on genomic DNA from the different species using consensus ORX primer pairs OR5B-OR3B and OR3.1-OR7.1 chosen respectively in the transmembrane

individual ORX clones were sequenced per taxon. A total of 221 ORX sequences, representing ten species, was analyzed. These sequences are distributed in different groups whose percentage of nucleotide sequence identity (NSI) ranges from ~35 to >99%. The corresponding amino acid sequences were compared to a variety of ORX sequences from the public databases and previous studies. See Rouquier et al., (1998) *Nature Genet.* 18, 243-50.

All sequences have the characteristic features of olfactory receptors, with a heptahelical structure and conserved motifs as previously defined. See Buck et al., (1991) *Cell* 65, 175-187; Rouquier et al., (1998) *Nature Genet.* 18, 243-50; and Rouquier et al., (1998) *Hum. Mol. Genet.* 7, 1337-45. The use of two pairs of consensus primers made the sampling representative of the ORX gene repertoire. Primate sequences are distributed in seven families (sequences that share >40% amino-acid identity (ASI) define a family), and 56 subfamilies (sequences that share >60% ASI define a subfamily). Group 1-II of family 1 represents the zone of overlap of sequences derived from using the two primer pairs (See FIG. 2).

Non-human primate ORX genes are represented in 6 families and about 45 subfamilies. Numerous sequences are grouped in family 1 (~66%) comprising subfamily 1A, the largest subfamily (57/221, 26%). Subfamily 1B is almost devoid of coding human ORX sequences (FIG. 2). Subfamily 1A contains only human pseudogenes originating from chromosomes 14 and 19 whereas subfamily 1B contains human pseudogenes lying on various chromosomes. As has been previously found for human, the amino-acid sequences deduced from the non-human primate sequences revealed many pseudogenes (FIG. 2 and Table 1).

Table 1 provides information about the evolution of the pseudogene fraction along with the evolution of primates. Hominoids present the highest fraction of pseudogenes (39 to >70%, average ~50%). Old world monkeys (macaque and baboon) have a lower pseudogene fraction (20 to 35%, average 27%), while even fewer pseudogenes were found among the sequences derived from new world monkeys. Only one pseudogene (SBO64) was identified among the 49 sequences obtained from marmoset and two species of squirrel-monkey. In contrast, 37% of the prosimian lemur ORX sequences were pseudogenes.

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**TABLE 1**

Species							
	Common name		Number of sequences analyzed	% ORF	% pseudogenes	Average % pseudogenes	
Hominoids	Human	Homo sapiens (HSA)	99	30	70	50 %	
	Chimpanzee	Pan troglodytes (PTR)	21	52	48		
	Gorilla	Gorilla gorilla (GGO)	18	50	50		
	Orangutan	Pongo pygmaeus (PPY)	23	61	39		
	Gibbon	Hylobates lar (HLA)	22	59	41		
Old world monkeys	Macaque	Macaca sylvanus (MSY)	20	65	35	27 %	
	Baboon	Papio papio (PPA)	21	81	19		
New world monkeys	Marmoset	Callithrix jacchus (CJA)	19	100	0	2 %	
	Squirrel-monkey	Saimiri sciurus (SSC)	15	100	0		
		Saimiri boliviensis (SBO)	15	93	7		

Prosimians	Lemur	Eulemur fulvus (EFU)	19	58	42	37 %
		Eulemur rubriventer (ERU)	16	69	31	
Rodents	Mouse	Mus musculus (MMU)	33	100	0	0 %
Fish	Zebrafish	Danio rerio (DRE)	3	100	0	0 %

Diverse reasons have been suggested that could account for the differences in olfactory ability among mammals, *i.e.*, the size of the anatomical structures devoted to olfaction (olfactory epithelium, olfactory bulb, cortical structures), or the number of ORX families/subfamilies, and the total number and diversity of expressed ORX genes. The olfactory epithelial surface of macrosmatic animals, such as dogs, is larger than in microsmatic humans. On the other hand, using unique dog sequence probes that represent specific ORX subfamilies and which will not cross-hybridize with other subfamilies, comparative analyses have been performed by Southern blot analysis among a panel of mammals including dog and human. The number of ORX sequences per subfamily is similar in microsmatic and macrosmatic animals. A high fraction (>70%) of the human ORX genes have been mutated during evolution into pseudogenes. Chromosomes 7, 16 or 17 contained a high fraction of potentially coding ORX sequences, whereas other chromosomes such as chromosome 3 or 11 contained primarily pseudogenes. Other studies on chromosome 17 and on chromosome 11 in which 75% of the ORX sequences identified were pseudogenes, support these observations.

All ORX sequences derived from mouse are potentially coding. No pseudogenes were detected either by sequencing randomly selected ORX sequences or by deliberately screening with human ORX pseudogene probes. This indicates that the ORX pseudogene content is either zero or restricted to rare examples in mouse.

Thus, the reduction of the sense of smell could correlate with the fraction of functional ORX genes in the genome.

It is difficult to measure and compare the olfactory efficiency of different animal species. Various parameters such as the threshold of detection of odorants (sensitivity), the range of odors detectable and the discriminatory power (acuity) are key parts of the olfactory ability. Thus it is uncertain to determine precisely which of these parameters are taken in account when comparing two species, and therefore the origin of the olfactory deficiency of primates remains a controversial and difficult point to address.

The chromosomal distribution of the ORX gene repertoire arose through multiple duplication rounds giving rise to paralogous regions. Even though the number of duplication events may be different among the mammals, overall it appears that the number of ORX genes was established before the divergence of mammals. *See Ben-Arie et al., (1994) Hum. Mol. Genet.* 3, 229-35. This explains why, by Southern analysis, there is no striking difference in the

number of ORX genes of four different subfamilies between the sea lion, which has an underdeveloped olfactory apparatus, and other mammals. *See id.* On the other hand, the Southern blot approach does not reveal the functionality of the ORX sequences, and we predict that a large fraction of the sea lion ORX genes could be pseudogenes as has been described for the dolphin. *See Sharon et al., (1999) Genomics, 61, 24-36.* Similarly striking differences have been observed in the olfactory ability of different breeds of dogs. *See Issel-Tarver et al., (1996) Proc. Natl. Acad. Sci. USA 93, 10897-902.* Despite the variations in the size of the olfactory epithelium of the different breeds, it would be interesting to know what the biological basis is for the differences in performances observed between sight and scent hounds. One obvious possibility is loss of functional ORX genes, but, given the recent origin of all modern dogs this explanation seems unlikely. Other explanations could be changes in behavior, or in expression brought about by the modification of a key master transcription factor or in the unusual mechanism that allows only one ORX gene allele or the other to be expressed exclusively in any one epithelium cell.

### **ORX Nucleic Acids**

The nucleic acids of the invention include those that encode an ORX polypeptide or protein. As used herein, the terms polypeptide and protein are interchangeable.

In some embodiments, an ORX nucleic acid encodes a mature ORX polypeptide. As used herein, a “mature” form of a polypeptide or protein described herein relates to the product of a naturally occurring polypeptide or precursor form or proprotein. The naturally occurring polypeptide, precursor or proprotein includes, by way of nonlimiting example, the full-length gene product, encoded by the corresponding gene. Alternatively, it may be defined as the polypeptide, precursor or proprotein encoded by an open reading frame described herein. The product “mature” form arises, again by way of nonlimiting example, as a result of one or more naturally occurring processing steps that may take place within the cell in which the gene product arises. Examples of such processing steps leading to a “mature” form of a polypeptide or protein include the cleavage of the N-terminal methionine residue encoded by the initiation codon of an open reading frame, or the proteolytic cleavage of a signal peptide or leader sequence. Thus a mature form arising from a precursor polypeptide or protein that has residues 1 to N, where residue 1 is the N-terminal methionine, would have residues 2 through N remaining after removal

of the N-terminal methionine. Alternatively, a mature form arising from a precursor polypeptide or protein having residues 1 to N, in which an N-terminal signal sequence from residue 1 to residue M is cleaved, would have the residues from residue M+1 to residue N remaining. Further as used herein, a “mature” form of a polypeptide or protein may arise from a step of post-translational modification other than a proteolytic cleavage event. Such additional processes include, by way of non-limiting example, glycosylation, myristoylation or phosphorylation. In general, a mature polypeptide or protein may result from the operation of only one of these processes, or a combination of any of them.

Among the ORX nucleic acids is the nucleic acid whose sequence is provided by GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof. Additionally, the invention includes mutant or variant nucleic acids of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof, any of whose bases may be changed from the corresponding bases shown in the ORX nucleic acids, while still encoding a protein that maintains at least one of its ORX-like activities and physiological functions (*i.e.*, modulating angiogenesis, neuronal development). The invention further includes the complement of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, including fragments, derivatives, analogs and homologs thereof. The invention additionally includes nucleic acids or nucleic acid fragments, or complements thereto, whose structures include chemical modifications.

One aspect of the invention pertains to isolated nucleic acid molecules that encode ORX proteins or biologically active portions thereof. Also included are nucleic acid fragments sufficient for use as hybridization probes to identify ORX-encoding nucleic acids (*e.g.*, ORX mRNA) and fragments for use as polymerase chain reaction (PCR) primers for the amplification or mutation of ORX nucleic acid molecules. As used herein, the term “nucleic acid molecule” is intended to include DNA molecules (*e.g.*, cDNA or genomic DNA), RNA molecules (*e.g.*, mRNA), analogs of the DNA or RNA generated using nucleotide analogs, and derivatives, fragments and homologs thereof. The nucleic acid molecule can be single-stranded or double-stranded, but preferably is double-stranded DNA.

“Probes” refer to nucleic acid sequences of variable length, preferably between at least about 10 nucleotides (nt), 100 nt, or as many as about, *e.g.*, 6,000 nt, depending on use. Probes

are used in the detection of identical, similar, or complementary nucleic acid sequences. Longer length probes are usually obtained from a natural or recombinant source, are highly specific and much slower to hybridize than oligomers. Probes may be single- or double-stranded and designed to have specificity in PCR, membrane-based hybridization technologies, or ELISA-like technologies.

An "isolated" nucleic acid molecule is one that is separated from other nucleic acid molecules that are present in the natural source of the nucleic acid. Examples of isolated nucleic acid molecules include, but are not limited to, recombinant DNA molecules contained in a vector, recombinant DNA molecules maintained in a heterologous host cell, partially or substantially purified nucleic acid molecules, and synthetic DNA or RNA molecules. Preferably, an "isolated" nucleic acid is free of sequences which naturally flank the nucleic acid (*i.e.*, sequences located at the 5' and 3' ends of the nucleic acid) in the genomic DNA of the organism from which the nucleic acid is derived. For example, in various embodiments, the isolated ORX nucleic acid molecule can contain less than about 50 kb, 25 kb, 5 kb, 4 kb, 3 kb, 2 kb, 1 kb, 0.5 kb or 0.1 kb of nucleotide sequences which naturally flank the nucleic acid molecule in genomic DNA of the cell from which the nucleic acid is derived. Moreover, an "isolated" nucleic acid molecule, such as a cDNA molecule, can be substantially free of other cellular material or culture medium when produced by recombinant techniques, or of chemical precursors or other chemicals when chemically synthesized.

A nucleic acid molecule of the present invention, *e.g.*, a nucleic acid molecule having the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement of any of these nucleotide sequences, can be isolated using standard molecular biology techniques and the sequence information provided herein. Using all or a portion of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, as a hybridization probe, ORX nucleic acid sequences can be isolated using standard hybridization and cloning techniques (*e.g.*, as described in Sambrook *et al.*, eds., MOLECULAR CLONING: A LABORATORY MANUAL 2<sup>nd</sup> Ed., Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989; and Ausubel, *et al.*, eds., CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, New York, NY, 1993.)

A nucleic acid of the invention can be amplified using cDNA, mRNA or alternatively, genomic DNA, as a template and appropriate oligonucleotide primers according to standard PCR amplification techniques. The nucleic acid so amplified can be cloned into an appropriate vector and characterized by DNA sequence analysis. Furthermore, oligonucleotides corresponding to  
5 ORX nucleotide sequences can be prepared by standard synthetic techniques, *e.g.*, using an automated DNA synthesizer.

As used herein, the term “oligonucleotide” refers to a series of linked nucleotide residues, which oligonucleotide has a sufficient number of nucleotide bases to be used in a PCR reaction. A short oligonucleotide sequence may be based on, or designed from, a genomic or cDNA  
10 sequence and is used to amplify, confirm, or reveal the presence of an identical, similar or complementary DNA or RNA in a particular cell or tissue. Oligonucleotides comprise portions of a nucleic acid sequence having about 10 nt, 50 nt, or 100 nt in length, preferably about 15 nt to 30 nt in length. In one embodiment, an oligonucleotide comprising a nucleic acid molecule less than 100 nt in length would further comprise at least 6 contiguous nucleotides of GenBank  
15 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement thereof. Oligonucleotides may be chemically synthesized and may be used as probes.

In another embodiment, an isolated nucleic acid molecule of the invention comprises a nucleic acid molecule that is a complement of the nucleotide sequences shown in GenBank  
20 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a portion of this nucleotide sequence. A nucleic acid molecule that is complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 is one that is sufficiently complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989,  
25 AF127814-127907, and AF179716-179843 that it can hydrogen bond with little or no mismatches to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, thereby forming a stable duplex.

As used herein, the term “complementary” refers to Watson-Crick or Hoogsteen base pairing between nucleotide units of a nucleic acid molecule, and the term “binding” means the  
30 physical or chemical interaction between two polypeptides or compounds or associated polypeptides or compounds or combinations thereof. Binding includes ionic, non-ionic, Von der

Waals, hydrophobic interactions, etc. A physical interaction can be either direct or indirect. Indirect interactions may be through or due to the effects of another polypeptide or compound. Direct binding refers to interactions that do not take place through, or due to, the effect of another polypeptide or compound, but instead are without other substantial chemical intermediates.

5           Moreover, the nucleic acid molecule of the invention can comprise only a portion of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, *e.g.*, a fragment that can be used as a probe or primer, or a fragment encoding a biologically active portion of ORX. Fragments provided herein are defined as sequences of at least 6 (contiguous) nucleic acids or at least 4 (contiguous) amino  
10       acids, a length sufficient to allow for specific hybridization in the case of nucleic acids or for specific recognition of an epitope in the case of amino acids, respectively, and are at most some portion less than a full length sequence. Fragments may be derived from any contiguous portion of a nucleic acid or amino acid sequence of choice. Derivatives are nucleic acid sequences or amino acid sequences formed from the native compounds either directly or by modification or  
15       partial substitution. Analogs are nucleic acid sequences or amino acid sequences that have a structure similar to, but not identical to, the native compound but differs from it in respect to certain components or side chains. Analogs may be synthetic or from a different evolutionary origin and may have a similar or opposite metabolic activity compared to wild type.

          Derivatives and analogs may be full length or other than full length, if the derivative or  
20       analog contains a modified nucleic acid or amino acid, as described below. Derivatives or analogs of the nucleic acids or proteins of the invention include, but are not limited to, molecules comprising regions that are substantially homologous to the nucleic acids or proteins of the invention, in various embodiments, by at least about 70%, 80%, 85%, 90%, 95%, 98%, or even 99% identity (with a preferred identity of 80-99%) over a nucleic acid or amino acid sequence of  
25       identical size or when compared to an aligned sequence in which the alignment is done by a computer homology program known in the art, or whose encoding nucleic acid is capable of hybridizing to the complement of a sequence encoding the aforementioned proteins under stringent, moderately stringent, or low stringent conditions. See *e.g.* Ausubel, *et al.*, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, New York, NY, 1993, and below. An  
30       exemplary program is the Gap program (Wisconsin Sequence Analysis Package, Version 8 for UNIX, Genetics Computer Group, University Research Park, Madison, WI) using the default



settings, which uses the algorithm of Smith and Waterman (Adv. Appl. Math., 1981, 2: 482-489, which is incorporated herein by reference in its entirety).

A “homologous nucleic acid sequence” or “homologous amino acid sequence,” or variations thereof, refer to sequences characterized by a homology at the nucleotide level or amino acid level as discussed above. Homologous nucleotide sequences encode those sequences coding for isoforms of an ORX polypeptide. Isoforms can be expressed in different tissues of the same organism as a result of, for example, alternative splicing of RNA. Alternatively, isoforms can be encoded by different genes. In the present invention, homologous nucleotide sequences include nucleotide sequences encoding for an ORX polypeptide of species other than humans, including, but not limited to, mammals, and thus can include, *e.g.*, mouse, rat, rabbit, dog, cat cow, horse, and other organisms. Homologous nucleotide sequences also include, but are not limited to, naturally occurring allelic variations and mutations of the nucleotide sequences set forth herein. A homologous nucleotide sequence does not, however, include the nucleotide sequence encoding human ORX protein. Homologous nucleic acid sequences include those nucleic acid sequences that encode conservative amino acid substitutions (see below) in the amino acid sequence of an ORX polypeptide, as well as a polypeptide having ORX activity. Biological activities of the ORX proteins are described below. A homologous amino acid sequence does not encode the amino acid sequence of a human ORX polypeptide.

The nucleotide sequence determined from the cloning of the human ORX gene allows for the generation of probes and primers designed for use in identifying and/or cloning ORX homologues in other cell types, *e.g.*, from other tissues, as well as ORX homologues from other mammals. The probe/primer typically comprises a substantially purified oligonucleotide. The oligonucleotide typically comprises a region of nucleotide sequence that hybridizes under stringent conditions to at least about 12, 25, 50, 100, 150, 200, 250, 300, 350 or 400 or more consecutive sense strand nucleotide sequences of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or an anti-sense strand nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or of a naturally occurring mutant of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

Probes based on the human ORX nucleotide sequence can be used to detect transcripts or genomic sequences encoding the same or homologous proteins. In various embodiments, the

probe further comprises a label group attached thereto, *e.g.*, the label group can be a radioisotope, a fluorescent compound, an enzyme, or an enzyme co-factor. Such probes can be used as a part of a diagnostic test kit for identifying cells or tissue which misexpress an ORX protein, such as by measuring a level of an ORX-encoding nucleic acid in a sample of cells from a subject *e.g.*,  
5 detecting ORX mRNA levels or determining whether a genomic ORX gene has been mutated or deleted.

A "polypeptide having a biologically active portion of ORX" refers to polypeptides exhibiting activity similar, but not necessarily identical to, an activity of a polypeptide of the present invention, including mature forms, as measured in a particular biological assay, with or  
10 without dose dependency. A nucleic acid fragment encoding a "biologically active portion of ORX" can be prepared by isolating a portion of an ORX nucleic acid that encodes a polypeptide having an ORX biological activity (biological activities of the ORX proteins are described below), expressing the encoded portion of ORX protein (*e.g.*, by recombinant expression *in vitro*) and assessing the activity of the encoded portion of ORX. For example, a nucleic acid fragment  
15 encoding a biologically active portion of ORX can optionally include an ATP-binding domain. In another embodiment, a nucleic acid fragment encoding a biologically active portion of ORX includes one or more regions.

### **ORX Variants**

20 The invention further encompasses nucleic acid molecules that differ from the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 due to the degeneracy of the genetic code. These nucleic acid molecules thus encode the same ORX protein as that encoded by the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and  
25 AF179716-179843 *e.g.*, the ORX polypeptides.

In addition to the human ORX nucleic acids, it will be appreciated by those skilled in the art that DNA sequence polymorphisms that lead to changes in the amino acid sequences of ORX may exist within a population (*e.g.*, the human population). Such genetic polymorphism in the ORX gene may exist among individuals within a population due to natural allelic variation. As  
30 used herein, the terms "gene" and "recombinant gene" refer to nucleic acid molecules comprising an open reading frame encoding an ORX protein, preferably a mammalian ORX protein. Such

natural allelic variations can typically result in 1-5% variance in the nucleotide sequence of the ORX gene. Any and all such nucleotide variations and resulting amino acid polymorphisms in ORX that are the result of natural allelic variation and that do not alter the functional activity of ORX are intended to be within the scope of the invention.

5           Moreover, nucleic acid molecules encoding ORX proteins from other species, and thus that have a nucleotide sequence that differs from the human sequence of the ORX nucleic acid molecules are intended to be within the scope of the invention. Nucleic acid molecules corresponding to natural allelic variants and homologues of the ORX cDNAs of the invention can be isolated based on their homology to the human ORX nucleic acids disclosed herein using  
10           the human cDNAs, or a portion thereof, as a hybridization probe according to standard hybridization techniques under stringent hybridization conditions. For example, a soluble human ORX cDNA can be isolated based on its homology to human membrane-bound ORX. Likewise, a membrane-bound human ORX cDNA can be isolated based on its homology to soluble human ORX.

15           Accordingly, in another embodiment, an isolated nucleic acid molecule of the invention is at least 6 nucleotides in length and hybridizes under stringent conditions to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843. In another embodiment, the nucleic acid is at least 10, 25, 50, 100, 250, 500 or 750 nucleotides in length. In another  
20           embodiment, an isolated nucleic acid molecule of the invention hybridizes to the coding region. As used herein, the term "hybridizes under stringent conditions" is intended to describe conditions for hybridization and washing under which nucleotide sequences at least 60% homologous to each other typically remain hybridized to each other.

          Homologs (*i.e.*, nucleic acids encoding ORX proteins derived from species other than  
25           human) or other related sequences (*e.g.*, paralogs) can be obtained by low, moderate or high stringency hybridization with all or a portion of the particular human sequence as a probe using methods well known in the art for nucleic acid hybridization and cloning.

          As used herein, the phrase "stringent hybridization conditions" refers to conditions under which a probe, primer or oligonucleotide will hybridize to its target sequence, but to no other  
30           sequences. Stringent conditions are sequence-dependent and will be different in different circumstances. Longer sequences hybridize specifically at higher temperatures than shorter

sequences. Generally, stringent conditions are selected to be about 5 °C lower than the thermal melting point ( $T_m$ ) for the specific sequence at a defined ionic strength and pH. The  $T_m$  is the temperature (under defined ionic strength, pH and nucleic acid concentration) at which 50% of the probes complementary to the target sequence hybridize to the target sequence at equilibrium.

- 5 Since the target sequences are generally present at excess, at  $T_m$ , 50% of the probes are occupied at equilibrium. Typically, stringent conditions will be those in which the salt concentration is less than about 1.0 M sodium ion, typically about 0.01 to 1.0 M sodium ion (or other salts) at pH 7.0 to 8.3 and the temperature is at least about 30 °C for short probes, primers or oligonucleotides (e.g., 10 nt to 50 nt) and at least about 60°C for longer probes, primers and oligonucleotides.
- 10 Stringent conditions may also be achieved with the addition of destabilizing agents, such as formamide.

Stringent conditions are known to those skilled in the art and can be found in CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, N.Y. (1989), 6.3.1-6.3.6. Preferably, the conditions are such that sequences at least about 65%, 70%, 75%, 85%, 90%, 95%, 98%, or

15 99% homologous to each other typically remain hybridized to each other. A non-limiting example of stringent hybridization conditions is hybridization in a high salt buffer comprising 6X SSC, 50 mM Tris-HCl (pH 7.5), 1 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.02% BSA, and 500 mg/ml denatured salmon sperm DNA at 65 °C. This hybridization is followed by one or more washes in 0.2X SSC, 0.01% BSA at 50 °C. An isolated nucleic acid molecule of the invention

20 that hybridizes under stringent conditions to the sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 corresponds to a naturally occurring nucleic acid molecule. As used herein, a "naturally-occurring" nucleic acid molecule refers to an RNA or DNA molecule having a nucleotide sequence that occurs in nature (e.g., encodes a natural protein).

25 In a second embodiment, a nucleic acid sequence that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of moderate stringency is provided. A non-limiting example of moderate stringency hybridization conditions are hybridization in 6X SSC, 5X

30 Denhardt's solution, 0.5% SDS and 100 mg/ml denatured salmon sperm DNA at 55°C, followed by one or more washes in 1X SSC, 0.1% SDS at 37 °C. Other conditions of moderate stringency

that may be used are well known in the art. See, *e.g.*, Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A LABORATORY MANUAL, Stockton Press, NY.

5 In a third embodiment, a nucleic acid that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of low stringency, is provided. A non-limiting example of low stringency hybridization conditions are hybridization in 35% formamide, 5X SSC, 50 mM Tris-HCl (pH 7.5), 5 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.2% BSA, 100 mg/ml denatured  
10 salmon sperm DNA, 10% (wt/vol) dextran sulfate at 40 °C, followed by one or more washes in 2X SSC, 25 mM Tris-HCl (pH 7.4), 5 mM EDTA, and 0.1% SDS at 50 °C. Other conditions of low stringency that may be used are well known in the art (*e.g.*, as employed for cross-species hybridizations). See, *e.g.*, Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A  
15 LABORATORY MANUAL, Stockton Press, NY; Shilo and Weinberg, 1981, *Proc Natl Acad Sci USA* 78: 6789-6792.

### Conservative mutations

In addition to naturally-occurring allelic variants of the ORX sequence that may exist in  
20 the population, the skilled artisan will further appreciate that changes can be introduced by mutation into the nucleotide sequence of the ORX nucleic acid molecules, thereby leading to changes in the amino acid sequence of the encoded ORX protein, without altering the functional ability of the ORX protein. For example, nucleotide substitutions leading to amino acid substitutions at "non-essential" amino acid residues can be made in the sequence of GenBank  
25 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843. A "non-essential" amino acid residue is a residue that can be altered from the wild-type sequence of ORX without altering the biological activity, whereas an "essential" amino acid residue is required for biological activity. For example, amino acid residues that are conserved among the ORX proteins of the present invention, are predicted to be particularly unamenable to alteration.

30 Another aspect of the invention pertains to nucleic acid molecules encoding ORX proteins that contain changes in amino acid residues that are not essential for activity. Such ORX

proteins differ in amino acid sequence from the ORX polypeptides, yet retain biological activity. In one embodiment, the isolated nucleic acid molecule comprises a nucleotide sequence encoding a protein, wherein the protein comprises an amino acid sequence at least about 75% homologous to the amino acid sequence of the ORX polypeptides. Preferably, the protein encoded by the  
5 nucleic acid is at least about 80% homologous to the sequence of an ORX polypeptide, more preferably at least about 90%, 95%, 98%, and most preferably at least about 99% homologous to the sequence of an ORX polypeptide.

An isolated nucleic acid molecule encoding an ORX protein homologous to the protein of can be created by introducing one or more nucleotide substitutions, additions or deletions into the  
10 nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, such that one or more amino acid substitutions, additions or deletions are introduced into the encoded protein.

Mutations can be introduced into the nucleotide sequence of the ORX nucleic acid molecules by standard techniques, such as site-directed mutagenesis and PCR-mediated  
15 mutagenesis. Preferably, conservative amino acid substitutions are made at one or more predicted non-essential amino acid residues. A "conservative amino acid substitution" is one in which the amino acid residue is replaced with an amino acid residue having a similar side chain. Families of amino acid residues having similar side chains have been defined in the art. These families include amino acids with basic side chains (*e.g.*, lysine, arginine, histidine), acidic side  
20 chains (*e.g.*, aspartic acid, glutamic acid), uncharged polar side chains (*e.g.*, glycine, asparagine, glutamine, serine, threonine, tyrosine, cysteine), nonpolar side chains (*e.g.*, alanine, valine, leucine, isoleucine, proline, phenylalanine, methionine, tryptophan), beta-branched side chains (*e.g.*, threonine, valine, isoleucine) and aromatic side chains (*e.g.*, tyrosine, phenylalanine, tryptophan, histidine). Thus, a predicted nonessential amino acid residue in ORX is replaced  
25 with another amino acid residue from the same side chain family. Alternatively, in another embodiment, mutations can be introduced randomly along all or part of an ORX coding sequence, such as by saturation mutagenesis, and the resultant mutants can be screened for ORX biological activity to identify mutants that retain activity. Following mutagenesis of the ORX nucleic acid molecule, the encoded protein can be expressed by any recombinant technology  
30 known in the art and the activity of the protein can be determined.

In one embodiment, a mutant ORX protein can be assayed for (1) the ability to form protein:protein interactions with other ORX proteins, other cell-surface proteins, or biologically active portions thereof, (2) complex formation between a mutant ORX protein and an ORX receptor; (3) the ability of a mutant ORX protein to bind to an intracellular target protein or biologically active portion thereof; (*e.g.*, avidin proteins); (4) the ability to bind ORX protein; or (5) the ability to specifically bind an anti-ORX protein antibody.

### **Antisense ORX Nucleic Acids**

Another aspect of the invention pertains to isolated antisense nucleic acid molecules that are hybridizable to or complementary to the nucleic acid molecule comprising the nucleotide sequence of the ORX nucleic acid molecule, or fragments, analogs or derivatives thereof. An "antisense" nucleic acid comprises a nucleotide sequence that is complementary to a "sense" nucleic acid encoding a protein, *e.g.*, complementary to the coding strand of a double-stranded cDNA molecule or complementary to an mRNA sequence. In specific aspects, antisense nucleic acid molecules are provided that comprise a sequence complementary to at least about 10, 25, 50, 100, 250 or 500 nucleotides or an entire ORX coding strand, or to only a portion thereof. Nucleic acid molecules encoding fragments, homologs, derivatives and analogs of an ORX protein or antisense nucleic acids complementary to an ORX nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 are additionally provided.

In one embodiment, an antisense nucleic acid molecule is antisense to a "coding region" of the coding strand of a nucleotide sequence encoding ORX. The term "coding region" refers to the region of the nucleotide sequence comprising codons which are translated into amino acid residues. In another embodiment, the antisense nucleic acid molecule is antisense to a "noncoding region" of the coding strand of a nucleotide sequence encoding ORX. The term "noncoding region" refers to 5' and 3' sequences which flank the coding region that are not translated into amino acids (*i.e.*, also referred to as 5' and 3' untranslated regions).

Given the coding strand sequences encoding ORX disclosed herein, antisense nucleic acids of the invention can be designed according to the rules of Watson and Crick or Hoogsteen base pairing. The antisense nucleic acid molecule can be complementary to the entire coding region of ORX mRNA, but more preferably is an oligonucleotide that is antisense to only a

portion of the coding or noncoding region of ORX mRNA. For example, the antisense oligonucleotide can be complementary to the region surrounding the translation start site of ORX mRNA. An antisense oligonucleotide can be, for example, about 5, 10, 15, 20, 25, 30, 35, 40, 45 or 50 nucleotides in length. An antisense nucleic acid of the invention can be constructed using  
5 chemical synthesis or enzymatic ligation reactions using procedures known in the art. For example, an antisense nucleic acid (*e.g.*, an antisense oligonucleotide) can be chemically synthesized using naturally occurring nucleotides or variously modified nucleotides designed to increase the biological stability of the molecules or to increase the physical stability of the duplex formed between the antisense and sense nucleic acids, *e.g.*, phosphorothioate derivatives and  
10 acridine substituted nucleotides can be used.

Examples of modified nucleotides that can be used to generate the antisense nucleic acid include: 5-fluorouracil, 5-bromouracil, 5-chlorouracil, 5-iodouracil, hypoxanthine, xanthine, 4-acetylcytosine, 5-(carboxyhydroxymethyl) uracil, 5-carboxymethylaminomethyl-2-thiouridine, 5-carboxymethylaminomethyluracil, dihydrouracil, beta-D-galactosylqueosine, inosine,  
15 N6-isopentenyladenine, 1-methylguanine, 1-methylinosine, 2,2-dimethylguanine, 2-methyladenine, 2-methylguanine, 3-methylcytosine, 5-methylcytosine, N6-adenine, 7-methylguanine, 5-methylaminomethyluracil, 5-methoxyaminomethyl-2-thiouracil, beta-D-mannosylqueosine, 5'-methoxycarboxymethyluracil, 5-methoxyuracil, 2-methylthio-N6-isopentenyladenine, uracil-5-oxyacetic acid (v), wybutoxosine, pseudouracil,  
20 queosine, 2-thiocytosine, 5-methyl-2-thiouracil, 2-thiouracil, 4-thiouracil, 5-methyluracil, uracil-5-oxyacetic acid methylester, uracil-5-oxyacetic acid (v), 5-methyl-2-thiouracil, 3-(3-amino-3-N-2-carboxypropyl) uracil, (acp3)w, and 2,6-diaminopurine. Alternatively, the antisense nucleic acid can be produced biologically using an expression vector into which a nucleic acid has been subcloned in an antisense orientation (*i.e.*, RNA transcribed from the  
25 inserted nucleic acid will be of an antisense orientation to a target nucleic acid of interest, described further in the following subsection).

The antisense nucleic acid molecules of the invention are typically administered to a subject or generated *in situ* such that they hybridize with or bind to cellular mRNA and/or genomic DNA encoding an ORX protein to thereby inhibit expression of the protein, *e.g.*, by  
30 inhibiting transcription and/or translation. The hybridization can be by conventional nucleotide complementarity to form a stable duplex, or, for example, in the case of an antisense nucleic acid



molecule that binds to DNA duplexes, through specific interactions in the major groove of the double helix. An example of a route of administration of antisense nucleic acid molecules of the invention includes direct injection at a tissue site. Alternatively, antisense nucleic acid molecules can be modified to target selected cells and then administered systemically. For example, for systemic administration, antisense molecules can be modified such that they specifically bind to receptors or antigens expressed on a selected cell surface, *e.g.*, by linking the antisense nucleic acid molecules to peptides or antibodies that bind to cell surface receptors or antigens. The antisense nucleic acid molecules can also be delivered to cells using the vectors described herein. To achieve sufficient intracellular concentrations of antisense molecules, vector constructs in which the antisense nucleic acid molecule is placed under the control of a strong pol II or pol III promoter are preferred.

In yet another embodiment, the antisense nucleic acid molecule of the invention is an  $\alpha$ -anomeric nucleic acid molecule. An  $\alpha$ -anomeric nucleic acid molecule forms specific double-stranded hybrids with complementary RNA in which, contrary to the usual  $\beta$ -units, the strands run parallel to each other (Gaultier *et al.* (1987) *Nucleic Acids Res* 15: 6625-6641). The antisense nucleic acid molecule can also comprise a 2'-o-methylribonucleotide (Inoue *et al.* (1987) *Nucleic Acids Res* 15: 6131-6148) or a chimeric RNA-DNA analogue (Inoue *et al.* (1987) *FEBS Lett* 215: 327-330).

Such modifications include, by way of nonlimiting example, modified bases, and nucleic acids whose sugar phosphate backbones are modified or derivatized. These modifications are carried out at least in part to enhance the chemical stability of the modified nucleic acid, such that they may be used, for example, as antisense binding nucleic acids in therapeutic applications in a subject.

## **ORX Ribozymes and PNA moieties**

In still another embodiment, an antisense nucleic acid of the invention is a ribozyme. Ribozymes are catalytic RNA molecules with ribonuclease activity that are capable of cleaving a single-stranded nucleic acid, such as a mRNA, to which they have a complementary region. Thus, ribozymes (*e.g.*, hammerhead ribozymes (described in Haselhoff and Gerlach (1988) *Nature* 334:585-591)) can be used to catalytically cleave ORX mRNA transcripts to thereby inhibit translation of ORX mRNA. A ribozyme having specificity for an ORX-encoding nucleic

acid can be designed based upon the nucleotide sequence of an ORX DNA disclosed herein. For example, a derivative of a Tetrahymena L-19 IVS RNA can be constructed in which the nucleotide sequence of the active site is complementary to the nucleotide sequence to be cleaved in an ORX-encoding mRNA. See, *e.g.*, Cech *et al.* U.S. Pat. No. 4,987,071; and Cech *et al.* U.S. Pat. No. 5,116,742. Alternatively, ORX mRNA can be used to select a catalytic RNA having a specific ribonuclease activity from a pool of RNA molecules. See, *e.g.*, Bartel *et al.*, (1993) *Science* 261:1411-1418.

Alternatively, ORX gene expression can be inhibited by targeting nucleotide sequences complementary to the regulatory region of the ORX (*e.g.*, the ORX promoter and/or enhancers) to form triple helical structures that prevent transcription of the ORX gene in target cells. See generally, Helene. (1991) *Anticancer Drug Des.* 6: 569-84; Helene. *et al.* (1992) *Ann. N.Y. Acad. Sci.* 660:27-36; and Maher (1992) *Bioassays* 14: 807-15.

In various embodiments, the nucleic acids of ORX can be modified at the base moiety, sugar moiety or phosphate backbone to improve, *e.g.*, the stability, hybridization, or solubility of the molecule. For example, the deoxyribose phosphate backbone of the nucleic acids can be modified to generate peptide nucleic acids (see Hyrup *et al.* (1996) *Bioorg Med Chem* 4: 5-23). As used herein, the terms "peptide nucleic acids" or "PNAs" refer to nucleic acid mimics, *e.g.*, DNA mimics, in which the deoxyribose phosphate backbone is replaced by a pseudopeptide backbone and only the four natural nucleobases are retained. The neutral backbone of PNAs has been shown to allow for specific hybridization to DNA and RNA under conditions of low ionic strength. The synthesis of PNA oligomers can be performed using standard solid phase peptide synthesis protocols as described in Hyrup *et al.* (1996) above; Perry-O'Keefe *et al.* (1996) *PNAS* 93: 14670-675.

PNAs of ORX can be used in therapeutic and diagnostic applications. For example, PNAs can be used as antisense or antigene agents for sequence-specific modulation of gene expression by, *e.g.*, inducing transcription or translation arrest or inhibiting replication. PNAs of ORX can also be used, *e.g.*, in the analysis of single base pair mutations in a gene by, *e.g.*, PNA directed PCR clamping; as artificial restriction enzymes when used in combination with other enzymes, *e.g.*, S1 nucleases (Hyrup B. (1996) above); or as probes or primers for DNA sequence and hybridization (Hyrup *et al.* (1996), above; Perry-O'Keefe (1996), above).

In another embodiment, PNAs of ORX can be modified, *e.g.*, to enhance their stability or cellular uptake, by attaching lipophilic or other helper groups to PNA, by the formation of PNA-DNA chimeras, or by the use of liposomes or other techniques of drug delivery known in the art. For example, PNA-DNA chimeras of ORX can be generated that may combine the advantageous properties of PNA and DNA. Such chimeras allow DNA recognition enzymes, *e.g.*, RNase H and DNA polymerases, to interact with the DNA portion while the PNA portion would provide high binding affinity and specificity. PNA-DNA chimeras can be linked using linkers of appropriate lengths selected in terms of base stacking, number of bonds between the nucleobases, and orientation (Hyrup (1996) above). The synthesis of PNA-DNA chimeras can be performed as described in Hyrup (1996) above and Finn *et al.* (1996) *Nucl Acids Res* 24: 3357-63. For example, a DNA chain can be synthesized on a solid support using standard phosphoramidite coupling chemistry, and modified nucleoside analogs, *e.g.*, 5'-(4-methoxytrityl) amino-5'-deoxy-thymidine phosphoramidite, can be used between the PNA and the 5' end of DNA (Mag *et al.* (1989) *Nucl Acid Res* 17: 5973-88). PNA monomers are then coupled in a stepwise manner to produce a chimeric molecule with a 5' PNA segment and a 3' DNA segment (Finn *et al.* (1996) above). Alternatively, chimeric molecules can be synthesized with a 5' DNA segment and a 3' PNA segment. See, Petersen *et al.* (1975) *Bioorg Med Chem Lett* 5: 1119-11124.

In other embodiments, the oligonucleotide may include other appended groups such as peptides (*e.g.*, for targeting host cell receptors *in vivo*), or agents facilitating transport across the cell membrane (see, *e.g.*, Letsinger *et al.*, 1989, *Proc. Natl. Acad. Sci. U.S.A.* 86:6553-6556; Lemaitre *et al.*, 1987, *Proc. Natl. Acad. Sci.* 84:648-652; PCT Publication No. W088/09810) or the blood-brain barrier (see, *e.g.*, PCT Publication No. W089/10134). In addition, oligonucleotides can be modified with hybridization triggered cleavage agents (See, *e.g.*, Krol *et al.*, 1988, *BioTechniques* 6:958-976) or intercalating agents. (See, *e.g.*, Zon, 1988, *Pharm. Res.* 5: 539-549). To this end, the oligonucleotide may be conjugated to another molecule, *e.g.*, a peptide, a hybridization triggered cross-linking agent, a transport agent, a hybridization-triggered cleavage agent, etc.

## ORX Polypeptides

An ORX polypeptide of the invention includes the ORX-like protein whose sequence is provided in GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884, AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-179811, AF179814, AF179816-179818, AF179820, AF179822-179832, AF179834-179839, AF179841-179843, and AF073959-073989. The invention also includes a mutant or variant protein any of whose residues may be changed from the corresponding residue of the ORX polypeptide while still encoding a protein that maintains its ORX-like activities and physiological functions, or a functional fragment thereof. In some embodiments, up to 20% or more of the residues may be so changed in the mutant or variant protein. In some embodiments, the ORX polypeptide according to the invention is a mature polypeptide.

In general, an ORX -like variant that preserves ORX-like function includes any variant in which residues at a particular position in the sequence have been substituted by other amino acids, and further include the possibility of inserting an additional residue or residues between two residues of the parent protein as well as the possibility of deleting one or more residues from the parent sequence. Any amino acid substitution, insertion, or deletion is encompassed by the invention. In favorable circumstances, the substitution is a conservative substitution as defined above.

One aspect of the invention pertains to isolated ORX proteins, and biologically active portions thereof, or derivatives, fragments, analogs or homologs thereof. Also provided are polypeptide fragments suitable for use as immunogens to raise anti-ORX antibodies. In one embodiment, native ORX proteins can be isolated from cells or tissue sources by an appropriate purification scheme using standard protein purification techniques. In another embodiment, ORX proteins are produced by recombinant DNA techniques. Alternative to recombinant expression, an ORX protein or polypeptide can be synthesized chemically using standard peptide synthesis techniques.

An "isolated" or "purified" protein or biologically active portion thereof is substantially free of cellular material or other contaminating proteins from the cell or tissue source from which the ORX protein is derived, or substantially free from chemical precursors or other chemicals when chemically synthesized. The language "substantially free of cellular material" includes preparations of ORX protein in which the protein is separated from cellular components of the cells from which it is isolated or recombinantly produced. In one embodiment, the language "substantially free of cellular material" includes preparations of ORX protein having less than about 30% (by dry weight) of non-ORX protein (also referred to herein as a "contaminating protein"), more preferably less than about 20% of non-ORX protein, still more preferably less than about 10% of non-ORX protein, and most preferably less than about 5% non-ORX protein. When the ORX protein or biologically active portion thereof is recombinantly produced, it is also preferably substantially free of culture medium, *i.e.*, culture medium represents less than about 20%, more preferably less than about 10%, and most preferably less than about 5% of the volume of the protein preparation.

The language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein in which the protein is separated from chemical precursors or other chemicals that are involved in the synthesis of the protein. In one embodiment, the language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein having less than about 30% (by dry weight) of chemical precursors or non-ORX chemicals, more preferably less than about 20% chemical precursors or non-ORX chemicals, still more preferably less than about 10% chemical precursors or non-ORX chemicals, and most preferably less than about 5% chemical precursors or non-ORX chemicals.

Biologically active portions of an ORX protein include peptides comprising amino acid sequences sufficiently homologous to or derived from the amino acid sequence of the ORX protein, *e.g.*, the amino acid sequence of the ORX polypeptides that include fewer amino acids than the full length ORX proteins, and exhibit at least one activity of an ORX protein. Typically, biologically active portions comprise a domain or motif with at least one activity of the ORX protein. A biologically active portion of an ORX protein can be a polypeptide which is, for example, 10, 25, 50, 100 or more amino acids in length.

In some embodiments, an ORX protein of the invention includes the amino acid sequence of the herein described polypeptide and a number of amino acids on the amino terminus of the

ORX protein, the carboxy terminus of the ORX protein, or a number of amino acids on both termini of the disclosed ORX protein. Thus, the ORX protein can include 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, or 75 or more amino acids on the amino terminus, the carboxy terminus, or both termini of the disclosed amino acid sequence.

5           A biologically active portion of an ORX protein of the present invention may contain at least one of the above-identified domains conserved between the ORX proteins, *e.g.* TSR modules. Moreover, other biologically active portions, in which other regions of the protein are deleted, can be prepared by recombinant techniques and evaluated for one or more of the functional activities of a native ORX protein.

10           In an embodiment, the ORX protein has an amino acid sequence of an ORX polypeptides. In other embodiments, the ORX protein is substantially homologous to an ORX polypeptide and retains the functional activity of the ORX polypeptide yet differs in amino acid sequence due to natural allelic variation or mutagenesis, as described in detail below. Accordingly, in another embodiment, the ORX protein is a protein that comprises an amino acid sequence at least about  
15           45% homologous to the amino acid sequence of an ORX polypeptide and retains the functional activity of the ORX polypeptides.

#### **Determining homology between two or more sequence**

20           To determine the percent homology of two amino acid sequences or of two nucleic acids, the sequences are aligned for optimal comparison purposes (*e.g.*, gaps can be introduced in either of the sequences being compared for optimal alignment between the sequences). The amino acid residues or nucleotides at corresponding amino acid positions or nucleotide positions are then compared. When a position in the first sequence is occupied by the same amino acid residue or nucleotide as the corresponding position in the second sequence, then the molecules are  
25           homologous at that position (*i.e.*, as used herein amino acid or nucleic acid "homology" is equivalent to amino acid or nucleic acid "identity").

          The nucleic acid sequence homology may be determined as the degree of identity between two sequences. The homology may be determined using computer programs known in the art, such as GAP software provided in the GCG program package. See, *Needleman and Wunsch*  
30           1970 *J Mol Biol* 48: 443-453. Using GCG GAP software with the following settings for nucleic acid sequence comparison: GAP creation penalty of 5.0 and GAP extension penalty of 0.3, the

coding region of the analogous nucleic acid sequences referred to above exhibits a degree of identity preferably of at least 70%, 75%, 80%, 85%, 90%, 95%, 98%, or 99%, with the CDS (encoding) part of the DNA sequence shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

5           The term "sequence identity" refers to the degree to which two polynucleotide or polypeptide sequences are identical on a residue-by-residue basis over a particular region of comparison. The term "percentage of sequence identity" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical nucleic acid base (*e.g.*, A, T, C, G, U, or I, in the case of nucleic acids)  
10 occurs in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of sequence identity. The term "substantial identity" as used herein denotes a characteristic of a polynucleotide sequence, wherein the polynucleotide comprises a sequence that has at least 80 percent sequence identity,  
15 preferably at least 85 percent identity and often 90 to 95 percent sequence identity, more usually at least 99 percent sequence identity as compared to a reference sequence over a comparison region. The term "percentage of positive residues" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical and conservative amino acid substitutions, as defined above, occur in both  
20 sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of positive residues.

#### **Chimeric and fusion proteins**

25           The invention also provides ORX chimeric or fusion proteins. As used herein, an ORX "chimeric protein" or "fusion protein" comprises an ORX polypeptide operatively linked to a non-ORX polypeptide. An "ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to ORX, whereas a "non-ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to a protein that is not substantially homologous to  
30 the ORX protein, *e.g.*, a protein that is different from the ORX protein and that is derived from the same or a different organism. Within an ORX fusion protein the ORX polypeptide can

correspond to all or a portion of an ORX protein. In one embodiment, an ORX fusion protein comprises at least one biologically active portion of an ORX protein. In another embodiment, an ORX fusion protein comprises at least two biologically active portions of an ORX protein.

Within the fusion protein, the term "operatively linked" is intended to indicate that the ORX polypeptide and the non-ORX polypeptide are fused in-frame to each other. The non-ORX polypeptide can be fused to the N-terminus or C-terminus of the ORX polypeptide.

For example, in one embodiment an ORX fusion protein comprises an ORX polypeptide operably linked to the extracellular domain of a second protein. Such fusion proteins can be further utilized in screening assays for compounds that modulate ORX activity (such assays are described in detail below).

In another embodiment, the fusion protein is a GST-ORX fusion protein in which the ORX sequences are fused to the C-terminus of the GST (*i.e.*, glutathione S-transferase) sequences. Such fusion proteins can facilitate the purification of recombinant ORX.

In another embodiment, the fusion protein is an ORX-immunoglobulin fusion protein in which the ORX sequences comprising one or more domains are fused to sequences derived from a member of the immunoglobulin protein family. The ORX-immunoglobulin fusion proteins of the invention can be incorporated into pharmaceutical compositions and administered to a subject to inhibit an interaction between an ORX ligand and an ORX protein on the surface of a cell, to thereby suppress ORX-mediated signal transduction *in vivo*. In one nonlimiting example, a contemplated ORX ligand of the invention is the ORX receptor. The ORX-immunoglobulin fusion proteins can be used to affect the bioavailability of an ORX cognate ligand. Inhibition of the ORX ligand/ORX interaction may be useful therapeutically for both the treatment of proliferative and differentiative disorders, *e.g.*, cancer as well as modulating (*e.g.*, promoting or inhibiting) cell survival. Moreover, the ORX-immunoglobulin fusion proteins of the invention can be used as immunogens to produce anti-ORX antibodies in a subject, to purify ORX ligands, and in screening assays to identify molecules that inhibit the interaction of ORX with an ORX ligand.

An ORX chimeric or fusion protein of the invention can be produced by standard recombinant DNA techniques. For example, DNA fragments coding for the different polypeptide sequences are ligated together in-frame in accordance with conventional techniques, *e.g.*, by employing blunt-ended or stagger-ended termini for ligation, restriction enzyme digestion



to provide for appropriate termini, filling-in of cohesive ends as appropriate, alkaline phosphatase treatment to avoid undesirable joining, and enzymatic ligation. In another embodiment, the fusion gene can be synthesized by conventional techniques including automated DNA synthesizers. Alternatively, PCR amplification of gene fragments can be carried out using anchor primers that give rise to complementary overhangs between two consecutive gene fragments that can subsequently be annealed and reamplified to generate a chimeric gene sequence (see, for example, Ausubel et al. (eds.) CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, 1992). Moreover, many expression vectors are commercially available that already encode a fusion moiety (*e.g.*, a GST polypeptide). An ORX-encoding nucleic acid can be cloned into such an expression vector such that the fusion moiety is linked in-frame to the ORX protein.

### **ORX agonists and antagonists**

The present invention also pertains to variants of the ORX proteins that function as either ORX agonists (mimetics) or as ORX antagonists. Variants of the ORX protein can be generated by mutagenesis, *e.g.*, discrete point mutation or truncation of the ORX protein. An agonist of the ORX protein can retain substantially the same, or a subset of, the biological activities of the naturally occurring form of the ORX protein. An antagonist of the ORX protein can inhibit one or more of the activities of the naturally occurring form of the ORX protein by, for example, competitively binding to a downstream or upstream member of a cellular signaling cascade which includes the ORX protein. Thus, specific biological effects can be elicited by treatment with a variant of limited function. In one embodiment, treatment of a subject with a variant having a subset of the biological activities of the naturally occurring form of the protein has fewer side effects in a subject relative to treatment with the naturally occurring form of the ORX proteins.

Variants of the ORX protein that function as either ORX agonists (mimetics) or as ORX antagonists can be identified by screening combinatorial libraries of mutants, *e.g.*, truncation mutants, of the ORX protein for ORX protein agonist or antagonist activity. In one embodiment, a variegated library of ORX variants is generated by combinatorial mutagenesis at the nucleic acid level and is encoded by a variegated gene library. A variegated library of ORX variants can be produced by, for example, enzymatically ligating a mixture of synthetic oligonucleotides into

gene sequences such that a degenerate set of potential ORX sequences is expressible as individual polypeptides, or alternatively, as a set of larger fusion proteins (*e.g.*, for phage display) containing the set of ORX sequences therein. There are a variety of methods which can be used to produce libraries of potential ORX variants from a degenerate oligonucleotide sequence.

- 5 Chemical synthesis of a degenerate gene sequence can be performed in an automatic DNA synthesizer, and the synthetic gene then ligated into an appropriate expression vector. Use of a degenerate set of genes allows for the provision, in one mixture, of all of the sequences encoding the desired set of potential ORX sequences. Methods for synthesizing degenerate oligonucleotides are known in the art (see, *e.g.*, Narang (1983) *Tetrahedron* 39:3; Itakura *et al.* (1984) *Annu Rev Biochem* 53:323; Itakura *et al.* (1984) *Science* 198:1056; Ike *et al.* (1983) *Nucl Acid Res* 11:477.
- 10

### **Polypeptide libraries**

- In addition, libraries of fragments of the ORX protein coding sequence can be used to generate a variegated population of ORX fragments for screening and subsequent selection of variants of an ORX protein. In one embodiment, a library of coding sequence fragments can be generated by treating a double stranded PCR fragment of an ORX coding sequence with a nuclease under conditions wherein nicking occurs only about once per molecule, denaturing the double stranded DNA, renaturing the DNA to form double stranded DNA that can include sense/antisense pairs from different nicked products, removing single stranded portions from reformed duplexes by treatment with S1 nuclease, and ligating the resulting fragment library into an expression vector. By this method, an expression library can be derived which encodes N-terminal and internal fragments of various sizes of the ORX protein.
- 15
- 20

- Several techniques are known in the art for screening gene products of combinatorial libraries made by point mutations or truncation, and for screening cDNA libraries for gene products having a selected property. Such techniques are adaptable for rapid screening of the gene libraries generated by the combinatorial mutagenesis of ORX proteins. The most widely used techniques, which are amenable to high throughput analysis, for screening large gene libraries typically include cloning the gene library into replicable expression vectors, transforming appropriate cells with the resulting library of vectors, and expressing the combinatorial genes under conditions in which detection of a desired activity facilitates isolation
- 25
- 30

of the vector encoding the gene whose product was detected. Recursive ensemble mutagenesis (REM), a new technique that enhances the frequency of functional mutants in the libraries, can be used in combination with the screening assays to identify ORX variants (Arkin and Yourvan (1992) PNAS 89:7811-7815; Delgrave *et al.* (1993) Protein Engineering 6:327-331).

5

### **ORX Antibodies**

Also included in the invention are antibodies to ORX proteins, or fragments of ORX proteins. The term "antibody" as used herein refers to immunoglobulin molecules and immunologically active portions of immunoglobulin (Ig) molecules, *i.e.*, molecules that contain an antigen binding site that specifically binds (immunoreacts with) an antigen. Such antibodies include, but are not limited to, polyclonal, monoclonal, chimeric, single chain, F<sub>ab</sub>, F<sub>ab</sub>' and F<sub>(ab)</sub>2 fragments, and an F<sub>ab</sub> expression library. In general, an antibody molecule obtained from humans relates to any of the classes IgG, IgM, IgA, IgE and IgD, which differ from one another by the nature of the heavy chain present in the molecule. Certain classes have subclasses as well, such as IgG<sub>1</sub>, IgG<sub>2</sub>, and others. Furthermore, in humans, the light chain may be a kappa chain or a lambda chain. Reference herein to antibodies includes a reference to all such classes, subclasses and types of human antibody species.

An isolated ORX-related protein of the invention may be intended to serve as an antigen, or a portion or fragment thereof, and additionally can be used as an immunogen to generate antibodies that immunospecifically bind the antigen, using standard techniques for polyclonal and monoclonal antibody preparation. The full-length protein can be used or, alternatively, the invention provides antigenic peptide fragments of the antigen for use as immunogens. An antigenic peptide fragment comprises at least 6 amino acid residues of the amino acid sequence of the full length protein and encompasses an epitope thereof such that an antibody raised against the peptide forms a specific immune complex with the full length protein or with any fragment that contains the epitope. Preferably, the antigenic peptide comprises at least 10 amino acid residues, or at least 15 amino acid residues, or at least 20 amino acid residues, or at least 30 amino acid residues. Preferred epitopes encompassed by the antigenic peptide are regions of the protein that are located on its surface; commonly these are hydrophilic regions.

In certain embodiments of the invention, at least one epitope encompassed by the antigenic peptide is a region of ORX-related protein that is located on the surface of the protein,

*e.g.*, a hydrophilic region. A hydrophobicity analysis of the human ORX-related protein sequence will indicate which regions of an ORX-related protein are particularly hydrophilic and, therefore, are likely to encode surface residues useful for targeting antibody production. As a means for targeting antibody production, hydropathy plots showing regions of hydrophilicity and hydrophobicity may be generated by any method well known in the art, including, for example, the Kyte Doolittle or the Hopp Woods methods, either with or without Fourier transformation. See, *e.g.*, Hopp and Woods, 1981, *Proc. Nat. Acad. Sci. USA* 78: 3824-3828; Kyte and Doolittle 1982, *J. Mol. Biol.* 157: 105-142, each of which is incorporated herein by reference in its entirety. Antibodies that are specific for one or more domains within an antigenic protein, or derivatives, fragments, analogs or homologs thereof, are also provided herein.

A protein of the invention, or a derivative, fragment, analog, homolog or ortholog thereof, may be utilized as an immunogen in the generation of antibodies that immunospecifically bind these protein components.

Various procedures known within the art may be used for the production of polyclonal or monoclonal antibodies directed against a protein of the invention, or against derivatives, fragments, analogs homologs or orthologs thereof (see, for example, *Antibodies: A Laboratory Manual*, Harlow E, and Lane D, 1988, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, incorporated herein by reference). Some of these antibodies are discussed below.

## **Polyclonal Antibodies**

For the production of polyclonal antibodies, various suitable host animals (*e.g.*, rabbit, goat, mouse or other mammal) may be immunized by one or more injections with the native protein, a synthetic variant thereof, or a derivative of the foregoing. An appropriate immunogenic preparation can contain, for example, the naturally occurring immunogenic protein, a chemically synthesized polypeptide representing the immunogenic protein, or a recombinantly expressed immunogenic protein. Furthermore, the protein may be conjugated to a second protein known to be immunogenic in the mammal being immunized. Examples of such immunogenic proteins include but are not limited to keyhole limpet hemocyanin, serum albumin, bovine thyroglobulin, and soybean trypsin inhibitor. The preparation can further include an adjuvant. Various adjuvants used to increase the immunological response include, but are not limited to, Freund's (complete and incomplete), mineral gels (*e.g.*, aluminum hydroxide), surface

active substances (*e.g.*, lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, dinitrophenol, etc.), adjuvants usable in humans such as Bacille Calmette-Guerin and *Corynebacterium parvum*, or similar immunostimulatory agents. Additional examples of adjuvants which can be employed include MPL-TDM adjuvant (monophosphoryl Lipid A, synthetic trehalose dicorynomycolate).

The polyclonal antibody molecules directed against the immunogenic protein can be isolated from the mammal (*e.g.*, from the blood) and further purified by well known techniques, such as affinity chromatography using protein A or protein G, which provide primarily the IgG fraction of immune serum. Subsequently, or alternatively, the specific antigen which is the target of the immunoglobulin sought, or an epitope thereof, may be immobilized on a column to purify the immune specific antibody by immunoaffinity chromatography. Purification of immunoglobulins is discussed, for example, by D. Wilkinson (*The Scientist*, published by The Scientist, Inc., Philadelphia PA, Vol. 14, No. 8 (April 17, 2000), pp. 25-28).

## Monoclonal Antibodies

The term "monoclonal antibody" (MAb) or "monoclonal antibody composition", as used herein, refers to a population of antibody molecules that contain only one molecular species of antibody molecule consisting of a unique light chain gene product and a unique heavy chain gene product. In particular, the complementarity determining regions (CDRs) of the monoclonal antibody are identical in all the molecules of the population. MAbs thus contain an antigen binding site capable of immunoreacting with a particular epitope of the antigen characterized by a unique binding affinity for it.

Monoclonal antibodies can be prepared using hybridoma methods, such as those described by Kohler and Milstein, *Nature*, 256:495 (1975). In a hybridoma method, a mouse, hamster, or other appropriate host animal, is typically immunized with an immunizing agent to elicit lymphocytes that produce or are capable of producing antibodies that will specifically bind to the immunizing agent. Alternatively, the lymphocytes can be immunized *in vitro*.

The immunizing agent will typically include the protein antigen, a fragment thereof or a fusion protein thereof. Generally, either peripheral blood lymphocytes are used if cells of human origin are desired, or spleen cells or lymph node cells are used if non-human mammalian sources are desired. The lymphocytes are then fused with an immortalized cell line using a suitable

fusing agent, such as polyethylene glycol, to form a hybridoma cell (Goding, Monoclonal Antibodies: Principles and Practice, Academic Press, (1986) pp. 59-103). Immortalized cell lines are usually transformed mammalian cells, particularly myeloma cells of rodent, bovine and human origin. Usually, rat or mouse myeloma cell lines are employed. The hybridoma cells can be cultured in a suitable culture medium that preferably contains one or more substances that inhibit the growth or survival of the unfused, immortalized cells. For example, if the parental cells lack the enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT or HPRT), the culture medium for the hybridomas typically will include hypoxanthine, aminopterin, and thymidine ("HAT medium"), which substances prevent the growth of HGPRT-deficient cells.

Preferred immortalized cell lines are those that fuse efficiently, support stable high level expression of antibody by the selected antibody-producing cells, and are sensitive to a medium such as HAT medium. More preferred immortalized cell lines are murine myeloma lines, which can be obtained, for instance, from the Salk Institute Cell Distribution Center, San Diego, California and the American Type Culture Collection, Manassas, Virginia. Human myeloma and mouse-human heteromyeloma cell lines also have been described for the production of human monoclonal antibodies (Kozbor, J. Immunol., 133:3001 (1984); Brodeur et al., Monoclonal Antibody Production Techniques and Applications, Marcel Dekker, Inc., New York, (1987) pp. 51-63).

The culture medium in which the hybridoma cells are cultured can then be assayed for the presence of monoclonal antibodies directed against the antigen. Preferably, the binding specificity of monoclonal antibodies produced by the hybridoma cells is determined by immunoprecipitation or by an *in vitro* binding assay, such as radioimmunoassay (RIA) or enzyme-linked immunoabsorbent assay (ELISA). Such techniques and assays are known in the art. The binding affinity of the monoclonal antibody can, for example, be determined by the Scatchard analysis of Munson and Pollard, Anal. Biochem., 107:220 (1980). Preferably, antibodies having a high degree of specificity and a high binding affinity for the target antigen are isolated.

After the desired hybridoma cells are identified, the clones can be subcloned by limiting dilution procedures and grown by standard methods. Suitable culture media for this purpose include, for example, Dulbecco's Modified Eagle's Medium and RPMI-1640 medium. Alternatively, the hybridoma cells can be grown *in vivo* as ascites in a mammal.

The monoclonal antibodies secreted by the subclones can be isolated or purified from the culture medium or ascites fluid by conventional immunoglobulin purification procedures such as, for example, protein A-Sepharose, hydroxylapatite chromatography, gel electrophoresis, dialysis, or affinity chromatography.

5           The monoclonal antibodies can also be made by recombinant DNA methods, such as those described in U.S. Patent No. 4,816,567. DNA encoding the monoclonal antibodies of the invention can be readily isolated and sequenced using conventional procedures (*e.g.*, by using oligonucleotide probes that are capable of binding specifically to genes encoding the heavy and light chains of murine antibodies). The hybridoma cells of the invention serve as a preferred  
10       source of such DNA. Once isolated, the DNA can be placed into expression vectors, which are then transfected into host cells such as simian COS cells, Chinese hamster ovary (CHO) cells, or myeloma cells that do not otherwise produce immunoglobulin protein, to obtain the synthesis of monoclonal antibodies in the recombinant host cells. The DNA also can be modified, for example, by substituting the coding sequence for human heavy and light chain constant domains  
15       in place of the homologous murine sequences (U.S. Patent No. 4,816,567; Morrison, Nature 368, 812-13 (1994)) or by covalently joining to the immunoglobulin coding sequence all or part of the coding sequence for a non-immunoglobulin polypeptide. Such a non-immunoglobulin polypeptide can be substituted for the constant domains of an antibody of the invention, or can be substituted for the variable domains of one antigen-combining site of an antibody of the  
20       invention to create a chimeric bivalent antibody.

### **Humanized Antibodies**

          The antibodies directed against the protein antigens of the invention can further comprise humanized antibodies or human antibodies. These antibodies are suitable for administration to  
25       humans without engendering an immune response by the human against the administered immunoglobulin. Humanized forms of antibodies are chimeric immunoglobulins, immunoglobulin chains or fragments thereof (such as Fv, Fab, Fab', F(ab')<sub>2</sub> or other antigen-binding subsequences of antibodies) that are principally comprised of the sequence of a human immunoglobulin, and contain minimal sequence derived from a non-human immunoglobulin.  
30       Humanization can be performed following the method of Winter and co-workers (Jones et al., Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-327 (1988); Verhoeven et al.,

Science, 239:1534-1536 (1988)), by substituting rodent CDRs or CDR sequences for the corresponding sequences of a human antibody. (See also U.S. Patent No. 5,225,539.) In some instances, Fv framework residues of the human immunoglobulin are replaced by corresponding non-human residues. Humanized antibodies can also comprise residues which are found neither  
5 in the recipient antibody nor in the imported CDR or framework sequences. In general, the humanized antibody will comprise substantially all of at least one, and typically two, variable domains, in which all or substantially all of the CDR regions correspond to those of a non-human immunoglobulin and all or substantially all of the framework regions are those of a human immunoglobulin consensus sequence. The humanized antibody optimally also will comprise at  
10 least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin (Jones et al., 1986; Riechmann et al., 1988; and Presta, Curr. Op. Struct. Biol., 2:593-596 (1992)).

### **Human Antibodies**

15 Fully human antibodies relate to antibody molecules in which essentially the entire sequences of both the light chain and the heavy chain, including the CDRs, arise from human genes. Such antibodies are termed "human antibodies", or "fully human antibodies" herein. Human monoclonal antibodies can be prepared by the trioma technique; the human B-cell hybridoma technique (see Kozbor, et al., 1983 Immunol Today 4: 72) and the EBV hybridoma  
20 technique to produce human monoclonal antibodies (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96). Human monoclonal antibodies may be utilized in the practice of the present invention and may be produced by using human hybridomas (see Cote, et al., 1983. Proc Natl Acad Sci USA 80: 2026-2030) or by transforming human B-cells with Epstein Barr Virus *in vitro* (see Cole, et al., 1985 In:  
25 MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96).

In addition, human antibodies can also be produced using additional techniques, including phage display libraries (Hoogenboom and Winter, J. Mol. Biol., 227:381 (1991); Marks et al., J. Mol. Biol., 222:581 (1991)). Similarly, human antibodies can be made by introducing human immunoglobulin loci into transgenic animals, *e.g.*, mice in which the  
30 endogenous immunoglobulin genes have been partially or completely inactivated. Upon challenge, human antibody production is observed, which closely resembles that seen in humans



in all respects, including gene rearrangement, assembly, and antibody repertoire. This approach is described, for example, in U.S. Patent Nos. 5,545,807; 5,545,806; 5,569,825; 5,625,126; 5,633,425; 5,661,016, and in Marks et al. (Bio/Technology 10, 779-783 (1992)); Lonberg et al. (Nature 368 856-859 (1994)); Morrison ( Nature 368, 812-13 (1994)); Fishwild et al, ( Nature 5 Biotechnology 14, 845-51 (1996)); Neuberger (Nature Biotechnology 14, 826 (1996)); and Lonberg and Huszar (Intern. Rev. Immunol. 13 65-93 (1995)).

Human antibodies may additionally be produced using transgenic nonhuman animals which are modified so as to produce fully human antibodies rather than the animal's endogenous antibodies in response to challenge by an antigen. (See PCT publication WO94/02602). The endogenous genes encoding the heavy and light immunoglobulin chains in the nonhuman host have been incapacitated, and active loci encoding human heavy and light chain immunoglobulins are inserted into the host's genome. The human genes are incorporated, for example, using yeast artificial chromosomes containing the requisite human DNA segments. An animal which provides all the desired modifications is then obtained as progeny by crossbreeding intermediate transgenic animals containing fewer than the full complement of the modifications. The preferred embodiment of such a nonhuman animal is a mouse, and is termed the Xenomouse<sup>TM</sup> as disclosed in PCT publications WO 96/33735 and WO 96/34096. This animal produces B cells which secrete fully human immunoglobulins. The antibodies can be obtained directly from the animal after immunization with an immunogen of interest, as, for example, a preparation of a polyclonal antibody, or alternatively from immortalized B cells derived from the animal, such as hybridomas producing monoclonal antibodies. Additionally, the genes encoding the immunoglobulins with human variable regions can be recovered and expressed to obtain the antibodies directly, or can be further modified to obtain analogs of antibodies such as, for example, single chain Fv molecules.

An example of a method of producing a nonhuman host, exemplified as a mouse, lacking expression of an endogenous immunoglobulin heavy chain is disclosed in U.S. Patent No. 5,939,598. It can be obtained by a method including deleting the J segment genes from at least one endogenous heavy chain locus in an embryonic stem cell to prevent rearrangement of the locus and to prevent formation of a transcript of a rearranged immunoglobulin heavy chain locus, the deletion being effected by a targeting vector containing a gene encoding a selectable marker;

and producing from the embryonic stem cell a transgenic mouse whose somatic and germ cells contain the gene encoding the selectable marker.

A method for producing an antibody of interest, such as a human antibody, is disclosed in U.S. Patent No. 5,916,771. It includes introducing an expression vector that contains a  
5 nucleotide sequence encoding a heavy chain into one mammalian host cell in culture, introducing an expression vector containing a nucleotide sequence encoding a light chain into another mammalian host cell, and fusing the two cells to form a hybrid cell. The hybrid cell expresses an antibody containing the heavy chain and the light chain.

10 In a further improvement on this procedure, a method for identifying a clinically relevant epitope on an immunogen, and a correlative method for selecting an antibody that binds immunospecifically to the relevant epitope with high affinity, are disclosed in PCT publication WO 99/53049.

#### **F<sub>ab</sub> Fragments and Single Chain Antibodies**

15 According to the invention, techniques can be adapted for the production of single-chain antibodies specific to an antigenic protein of the invention (see *e.g.*, U.S. Patent No. 4,946,778). In addition, methods can be adapted for the construction of F<sub>ab</sub> expression libraries (see *e.g.*, Huse, et al., 1989 Science 246: 1275-1281) to allow rapid and effective identification of  
20 monoclonal F<sub>ab</sub> fragments with the desired specificity for a protein or derivatives, fragments, analogs or homologs thereof. Antibody fragments that contain the idiotypes to a protein antigen may be produced by techniques known in the art including, but not limited to: (i) an F<sub>(ab)<sup>2</sup></sub> fragment produced by pepsin digestion of an antibody molecule; (ii) an F<sub>ab</sub> fragment generated by reducing the disulfide bridges of an F<sub>(ab)<sup>2</sup></sub> fragment; (iii) an F<sub>ab</sub> fragment generated by the treatment of the antibody molecule with papain and a reducing agent and (iv) F<sub>v</sub> fragments.

25

#### **Bispecific Antibodies**

Bispecific antibodies are monoclonal, preferably human or humanized, antibodies that have binding specificities for at least two different antigens. In the present case, one of the binding specificities is for an antigenic protein of the invention. The second binding target is any  
30 other antigen, and advantageously is a cell-surface protein or receptor or receptor subunit.

Methods for making bispecific antibodies are known in the art. Traditionally, the recombinant production of bispecific antibodies is based on the co-expression of two immunoglobulin heavy-chain/light-chain pairs, where the two heavy chains have different specificities (Milstein and Cuello, Nature, 305:537-539 (1983)). Because of the random assortment of immunoglobulin heavy and light chains, these hybridomas (quadromas) produce a potential mixture of ten different antibody molecules, of which only one has the correct bispecific structure. The purification of the correct molecule is usually accomplished by affinity chromatography steps. Similar procedures are disclosed in WO 93/08829, published 13 May 1993, and in Traunecker *et al.*, 1991 *EMBO J.*, 10:3655-3659.

Antibody variable domains with the desired binding specificities (antibody-antigen combining sites) can be fused to immunoglobulin constant domain sequences. The fusion preferably is with an immunoglobulin heavy-chain constant domain, comprising at least part of the hinge, CH2, and CH3 regions. It is preferred to have the first heavy-chain constant region (CH1) containing the site necessary for light-chain binding present in at least one of the fusions. DNAs encoding the immunoglobulin heavy-chain fusions and, if desired, the immunoglobulin light chain, are inserted into separate expression vectors, and are co-transfected into a suitable host organism. For further details of generating bispecific antibodies see, for example, Suresh *et al.*, Methods in Enzymology, 121:210 (1986).

According to another approach described in WO 96/27011, the interface between a pair of antibody molecules can be engineered to maximize the percentage of heterodimers which are recovered from recombinant cell culture. The preferred interface comprises at least a part of the CH3 region of an antibody constant domain. In this method, one or more small amino acid side chains from the interface of the first antibody molecule are replaced with larger side chains (*e.g.* tyrosine or tryptophan). Compensatory "cavities" of identical or similar size to the large side chain(s) are created on the interface of the second antibody molecule by replacing large amino acid side chains with smaller ones (*e.g.* alanine or threonine). This provides a mechanism for increasing the yield of the heterodimer over other unwanted end-products such as homodimers.

Bispecific antibodies can be prepared as full length antibodies or antibody fragments (*e.g.* F(ab')<sub>2</sub> bispecific antibodies). Techniques for generating bispecific antibodies from antibody fragments have been described in the literature. For example, bispecific antibodies can be prepared using chemical linkage. Brennan *et al.*, Science 229:81 (1985) describe a procedure

wherein intact antibodies are proteolytically cleaved to generate  $F(ab')_2$  fragments. These fragments are reduced in the presence of the dithiol complexing agent sodium arsenite to stabilize vicinal dithiols and prevent intermolecular disulfide formation. The Fab' fragments generated are then converted to thionitrobenzoate (TNB) derivatives. One of the Fab'-TNB derivatives is then reconverted to the Fab'-thiol by reduction with mercaptoethylamine and is mixed with an equimolar amount of the other Fab'-TNB derivative to form the bispecific antibody. The bispecific antibodies produced can be used as agents for the selective immobilization of enzymes.

Additionally, Fab' fragments can be directly recovered from *E. coli* and chemically coupled to form bispecific antibodies. Shalaby et al., J. Exp. Med. 175:217-225 (1992) describe the production of a fully humanized bispecific antibody  $F(ab')_2$  molecule. Each Fab' fragment was separately secreted from *E. coli* and subjected to directed chemical coupling *in vitro* to form the bispecific antibody. The bispecific antibody thus formed was able to bind to cells overexpressing the ErbB2 receptor and normal human T cells, as well as trigger the lytic activity of human cytotoxic lymphocytes against human breast tumor targets.

Various techniques for making and isolating bispecific antibody fragments directly from recombinant cell culture have also been described. For example, bispecific antibodies have been produced using leucine zippers. Kostelny et al., J. Immunol. 148(5):1547-1553 (1992). The leucine zipper peptides from the Fos and Jun proteins were linked to the Fab' portions of two different antibodies by gene fusion. The antibody homodimers were reduced at the hinge region to form monomers and then re-oxidized to form the antibody heterodimers. This method can also be utilized for the production of antibody homodimers. The "diabody" technology described by Hollinger et al., Proc. Natl. Acad. Sci. USA 90:6444-6448 (1993) has provided an alternative mechanism for making bispecific antibody fragments. The fragments comprise a heavy-chain variable domain ( $V_H$ ) connected to a light-chain variable domain ( $V_L$ ) by a linker which is too short to allow pairing between the two domains on the same chain. Accordingly, the  $V_H$  and  $V_L$  domains of one fragment are forced to pair with the complementary  $V_L$  and  $V_H$  domains of another fragment, thereby forming two antigen-binding sites. Another strategy for making bispecific antibody fragments by the use of single-chain Fv (sFv) dimers has also been reported. See, Gruber et al., J. Immunol. 152:5368 (1994).

Antibodies with more than two valencies are contemplated. For example, trispecific antibodies can be prepared. Tutt et al., J. Immunol. 147:60 (1991).

Exemplary bispecific antibodies can bind to two different epitopes, at least one of which originates in the protein antigen of the invention. Alternatively, an anti-antigenic arm of an immunoglobulin molecule can be combined with an arm which binds to a triggering molecule on a leukocyte such as a T-cell receptor molecule (*e.g.* CD2, CD3, CD28, or B7), or Fc receptors for IgG (Fc $\gamma$ R), such as Fc $\gamma$ RI (CD64), Fc $\gamma$ RII (CD32) and Fc $\gamma$ RIII (CD16) so as to focus cellular defense mechanisms to the cell expressing the particular antigen. Bispecific antibodies can also be used to direct cytotoxic agents to cells which express a particular antigen. These antibodies possess an antigen-binding arm and an arm which binds a cytotoxic agent or a radionuclide chelator, such as EOTUBE, DPTA, DOTA, or TETA. Another bispecific antibody of interest binds the protein antigen described herein and further binds tissue factor (TF).

#### **Heteroconjugate Antibodies**

Heteroconjugate antibodies are also within the scope of the present invention. Heteroconjugate antibodies are composed of two covalently joined antibodies. Such antibodies have, for example, been proposed to target immune system cells to unwanted cells (U.S. Patent No. 4,676,980), and for treatment of HIV infection (WO 91/00360; WO 92/200373; EP 03089). It is contemplated that the antibodies can be prepared *in vitro* using known methods in synthetic protein chemistry, including those involving crosslinking agents. For example, immunotoxins can be constructed using a disulfide exchange reaction or by forming a thioether bond. Examples of suitable reagents for this purpose include iminothiolate and methyl-4-mercaptobutyrimidate and those disclosed, for example, in U.S. Patent No. 4,676,980.

## Effector Function Engineering

It can be desirable to modify the antibody of the invention with respect to effector function, so as to enhance, *e.g.*, the effectiveness of the antibody in treating cancer. For example, cysteine residue(s) can be introduced into the Fc region, thereby allowing interchain disulfide bond formation in this region. The homodimeric antibody thus generated can have improved internalization capability and/or increased complement-mediated cell killing and antibody-dependent cellular cytotoxicity (ADCC). See Caron et al., *J. Exp Med.*, 176: 1191-1195 (1992) and Shopes, *J. Immunol.*, 148: 2918-2922 (1992). Homodimeric antibodies with enhanced anti-tumor activity can also be prepared using heterobifunctional cross-linkers as described in Wolff et al. *Cancer Research*, 53: 2560-2565 (1993). Alternatively, an antibody can be engineered that has dual Fc regions and can thereby have enhanced complement lysis and ADCC capabilities. See Stevenson et al., *Anti-Cancer Drug Design*, 3: 219-230 (1989).

## Immunoconjugates

The invention also pertains to immunoconjugates comprising an antibody conjugated to a cytotoxic agent such as a chemotherapeutic agent, toxin (*e.g.*, an enzymatically active toxin of bacterial, fungal, plant, or animal origin, or fragments thereof), or a radioactive isotope (*i.e.*, a radioconjugate).

Chemotherapeutic agents useful in the generation of such immunoconjugates have been described above. Enzymatically active toxins and fragments thereof that can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain, modeccin A chain, alpha-sarcin, Aleurites fordii proteins, dianthin proteins, *Phytolaca americana* proteins (PAPI, PAPII, and PAP-S), momordica charantia inhibitor, curcin, crotin, *sapaonaria officinalis* inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin, and the tricothecenes. A variety of radionuclides are available for the production of radioconjugated antibodies. Examples include  $^{212}\text{Bi}$ ,  $^{131}\text{I}$ ,  $^{131}\text{In}$ ,  $^{90}\text{Y}$ , and  $^{186}\text{Re}$ .

Conjugates of the antibody and cytotoxic agent are made using a variety of bifunctional protein-coupling agents such as N-succinimidyl-3-(2-pyridyldithiol) propionate (SPDP), iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutaraldehyde), bis-azido

compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a ricin immunotoxin can be prepared as described in Vitetta et al., Science, 238: 1098 (1987).

5 Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026.

In another embodiment, the antibody can be conjugated to a "receptor" (such streptavidin) for utilization in tumor pretargeting wherein the antibody-receptor conjugate is administered to  
10 the patient, followed by removal of unbound conjugate from the circulation using a clearing agent and then administration of a "ligand" (e.g., avidin) that is in turn conjugated to a cytotoxic agent.

#### **ORX Recombinant Expression Vectors and Host Cells**

15 Another aspect of the invention pertains to vectors, preferably expression vectors, containing a nucleic acid encoding an ORX protein, or derivatives, fragments, analogs or homologs thereof. As used herein, the term "vector" refers to a nucleic acid molecule capable of transporting another nucleic acid to which it has been linked. One type of vector is a "plasmid", which refers to a circular double stranded DNA loop into which additional DNA segments can be  
20 ligated. Another type of vector is a viral vector, wherein additional DNA segments can be ligated into the viral genome. Certain vectors are capable of autonomous replication in a host cell into which they are introduced (e.g., bacterial vectors having a bacterial origin of replication and episomal mammalian vectors). Other vectors (e.g., non-episomal mammalian vectors) are integrated into the genome of a host cell upon introduction into the host cell, and thereby are  
25 replicated along with the host genome. Moreover, certain vectors are capable of directing the expression of genes to which they are operatively-linked. Such vectors are referred to herein as "expression vectors". In general, expression vectors of utility in recombinant DNA techniques are often in the form of plasmids. In the present specification, "plasmid" and "vector" can be used interchangeably as the plasmid is the most commonly used form of vector. However, the  
30 invention is intended to include such other forms of expression vectors, such as viral vectors

(e.g., replication defective retroviruses, adenoviruses and adeno-associated viruses), which serve equivalent functions.

The recombinant expression vectors of the invention comprise a nucleic acid of the invention in a form suitable for expression of the nucleic acid in a host cell, which means that the recombinant expression vectors include one or more regulatory sequences, selected on the basis of the host cells to be used for expression, that is operatively-linked to the nucleic acid sequence to be expressed. Within a recombinant expression vector, "operably-linked" is intended to mean that the nucleotide sequence of interest is linked to the regulatory sequence(s) in a manner that allows for expression of the nucleotide sequence (e.g., in an *in vitro* transcription/translation system or in a host cell when the vector is introduced into the host cell).

The term "regulatory sequence" is intended to include promoters, enhancers and other expression control elements (e.g., polyadenylation signals). Such regulatory sequences are described, for example, in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Regulatory sequences include those that direct constitutive expression of a nucleotide sequence in many types of host cell and those that direct expression of the nucleotide sequence only in certain host cells (e.g., tissue-specific regulatory sequences). It will be appreciated by those skilled in the art that the design of the expression vector can depend on such factors as the choice of the host cell to be transformed, the level of expression of protein desired, etc. The expression vectors of the invention can be introduced into host cells to thereby produce proteins or peptides, including fusion proteins or peptides, encoded by nucleic acids as described herein (e.g., ORX proteins, mutant forms of ORX proteins, fusion proteins, etc.).

The recombinant expression vectors of the invention can be designed for expression of ORX proteins in prokaryotic or eukaryotic cells. For example, ORX proteins can be expressed in bacterial cells such as *Escherichia coli*, insect cells (using baculovirus expression vectors) yeast cells or mammalian cells. Suitable host cells are discussed further in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Alternatively, the recombinant expression vector can be transcribed and translated *in vitro*, for example using T7 promoter regulatory sequences and T7 polymerase.

Expression of proteins in prokaryotes is most often carried out in *Escherichia coli* with vectors containing constitutive or inducible promoters directing the expression of either fusion or



non-fusion proteins. Fusion vectors add a number of amino acids to a protein encoded therein, usually to the amino terminus of the recombinant protein. Such fusion vectors typically serve three purposes: (i) to increase expression of recombinant protein; (ii) to increase the solubility of the recombinant protein; and (iii) to aid in the purification of the recombinant protein by acting as a ligand in affinity purification. Often, in fusion expression vectors, a proteolytic cleavage site is introduced at the junction of the fusion moiety and the recombinant protein to enable separation of the recombinant protein from the fusion moiety subsequent to purification of the fusion protein. Such enzymes, and their cognate recognition sequences, include Factor Xa, thrombin and enterokinase. Typical fusion expression vectors include pGEX (Pharmacia Biotech Inc; Smith and Johnson, 1988. *Gene* 67: 31-40), pMAL (New England Biolabs, Beverly, Mass.) and pRIT5 (Pharmacia, Piscataway, N.J.) that fuse glutathione S-transferase (GST), maltose E binding protein, or protein A, respectively, to the target recombinant protein.

Examples of suitable inducible non-fusion *E. coli* expression vectors include pTrc (Amrann *et al.*, (1988) *Gene* 69:301-315) and pET 11d (Studier *et al.*, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 60-89).

One strategy to maximize recombinant protein expression in *E. coli* is to express the protein in a host bacteria with an impaired capacity to proteolytically cleave the recombinant protein. See, e.g., Gottesman, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 119-128. Another strategy is to alter the nucleic acid sequence of the nucleic acid to be inserted into an expression vector so that the individual codons for each amino acid are those preferentially utilized in *E. coli* (see, e.g., Wada, *et al.*, 1992. *Nucl. Acids Res.* 20: 2111-2118). Such alteration of nucleic acid sequences of the invention can be carried out by standard DNA synthesis techniques.

In another embodiment, the ORX expression vector is a yeast expression vector. Examples of vectors for expression in yeast *Saccharomyces cerevisiae* include pYepSec1 (Baldari, *et al.*, 1987. *EMBO J.* 6: 229-234), pMFa (Kurjan and Herskowitz, 1982. *Cell* 30: 933-943), pJRY88 (Schultz *et al.*, 1987. *Gene* 54: 113-123), pYES2 (Invitrogen Corporation, San Diego, Calif.), and picZ (InVitrogen Corp, San Diego, Calif.).

Alternatively, ORX can be expressed in insect cells using baculovirus expression vectors. Baculovirus vectors available for expression of proteins in cultured insect cells (e.g., SF9 cells)

include the pAc series (Smith, *et al.*, 1983. *Mol. Cell. Biol.* 3: 2156-2165) and the pVL series (Lucklow and Summers, 1989. *Virology* 170: 31-39).

In yet another embodiment, a nucleic acid of the invention is expressed in mammalian cells using a mammalian expression vector. Examples of mammalian expression vectors include pCDM8 (Seed, 1987. *Nature* 329: 840) and pMT2PC (Kaufman, *et al.*, 1987. *EMBO J.* 6: 187-195). When used in mammalian cells, the expression vector's control functions are often provided by viral regulatory elements. For example, commonly used promoters are derived from polyoma, adenovirus 2, cytomegalovirus, and simian virus 40. For other suitable expression systems for both prokaryotic and eukaryotic cells see, *e.g.*, Chapters 16 and 17 of Sambrook, *et al.*, MOLECULAR CLONING: A LABORATORY MANUAL. 2nd ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989.

In another embodiment, the recombinant mammalian expression vector is capable of directing expression of the nucleic acid preferentially in a particular cell type (*e.g.*, tissue-specific regulatory elements are used to express the nucleic acid). Tissue-specific regulatory elements are known in the art. Non-limiting examples of suitable tissue-specific promoters include the albumin promoter (liver-specific; Pinkert, *et al.*, 1987. *Genes Dev.* 1: 268-277), lymphoid-specific promoters (Calame and Eaton, 1988. *Adv. Immunol.* 43: 235-275), in particular promoters of T cell receptors (Winoto and Baltimore, 1989. *EMBO J.* 8: 729-733) and immunoglobulins (Banerji, *et al.*, 1983. *Cell* 33: 729-740; Queen and Baltimore, 1983. *Cell* 33: 741-748), neuron-specific promoters (*e.g.*, the neurofilament promoter; Byrne and Ruddle, 1989. *Proc. Natl. Acad. Sci. USA* 86: 5473-5477), pancreas-specific promoters (Edlund, *et al.*, 1985. *Science* 230: 912-916), and mammary gland-specific promoters (*e.g.*, milk whey promoter; U.S. Pat. No. 4,873,316 and European Application Publication No. 264,166). Developmentally-regulated promoters are also encompassed, *e.g.*, the murine hox promoters (Kessel and Gruss, 1990. *Science* 249: 374-379) and the  $\alpha$ -fetoprotein promoter (Campes and Tilghman, 1989. *Genes Dev.* 3: 537-546).

The invention further provides a recombinant expression vector comprising a DNA molecule of the invention cloned into the expression vector in an antisense orientation. That is, the DNA molecule is operatively-linked to a regulatory sequence in a manner that allows for expression (by transcription of the DNA molecule) of an RNA molecule that is antisense to ORX mRNA. Regulatory sequences operatively linked to a nucleic acid cloned in the antisense

orientation can be chosen that direct the continuous expression of the antisense RNA molecule in a variety of cell types, for instance viral promoters and/or enhancers, or regulatory sequences can be chosen that direct constitutive, tissue specific or cell type specific expression of antisense RNA. The antisense expression vector can be in the form of a recombinant plasmid, phagemid or attenuated virus in which antisense nucleic acids are produced under the control of a high efficiency regulatory region, the activity of which can be determined by the cell type into which the vector is introduced. For a discussion of the regulation of gene expression using antisense genes *see, e.g.,* Weintraub, *et al.*, "Antisense RNA as a molecular tool for genetic analysis," *Reviews-Trends in Genetics*, Vol. 1(1) 1986.

Another aspect of the invention pertains to host cells into which a recombinant expression vector of the invention has been introduced. The terms "host cell" and "recombinant host cell" are used interchangeably herein. It is understood that such terms refer not only to the particular subject cell but also to the progeny or potential progeny of such a cell. Because certain modifications may occur in succeeding generations due to either mutation or environmental influences, such progeny may not, in fact, be identical to the parent cell, but are still included within the scope of the term as used herein.

A host cell can be any prokaryotic or eukaryotic cell. For example, ORX protein can be expressed in bacterial cells such as *E. coli*, insect cells, yeast or mammalian cells (such as human, Chinese hamster ovary cells (CHO) or COS cells). Other suitable host cells are known to those skilled in the art.

Vector DNA can be introduced into prokaryotic or eukaryotic cells via conventional transformation or transfection techniques. As used herein, the terms "transformation" and "transfection" are intended to refer to a variety of art-recognized techniques for introducing foreign nucleic acid (*e.g.*, DNA) into a host cell, including calcium phosphate or calcium chloride co-precipitation, DEAE-dextran-mediated transfection, lipofection, or electroporation. Suitable methods for transforming or transfecting host cells can be found in Sambrook, *et al.* (MOLECULAR CLONING: A LABORATORY MANUAL. 2nd ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989), and other laboratory manuals.

For stable transfection of mammalian cells, it is known that, depending upon the expression vector and transfection technique used, only a small fraction of cells may integrate the foreign DNA into their genome. In order to identify and select these integrants, a gene that

encodes a selectable marker (*e.g.*, resistance to antibiotics) is generally introduced into the host cells along with the gene of interest. Various selectable markers include those that confer resistance to drugs, such as G418, hygromycin and methotrexate. Nucleic acid encoding a selectable marker can be introduced into a host cell on the same vector as that encoding ORX or can be introduced on a separate vector. Cells stably transfected with the introduced nucleic acid can be identified by drug selection (*e.g.*, cells that have incorporated the selectable marker gene will survive, while the other cells die).

A host cell of the invention, such as a prokaryotic or eukaryotic host cell in culture, can be used to produce (*i.e.*, express) ORX protein. Accordingly, the invention further provides methods for producing ORX protein using the host cells of the invention. In one embodiment, the method comprises culturing the host cell of invention (into which a recombinant expression vector encoding ORX protein has been introduced) in a suitable medium such that ORX protein is produced. In another embodiment, the method further comprises isolating ORX protein from the medium or the host cell.

### **Transgenic ORX Animals**

The host cells of the invention can also be used to produce non-human transgenic animals. For example, in one embodiment, a host cell of the invention is a fertilized oocyte or an embryonic stem cell into which ORX protein-coding sequences have been introduced. Such host cells can then be used to create non-human transgenic animals in which exogenous ORX sequences have been introduced into their genome or homologous recombinant animals in which endogenous ORX sequences have been altered. Such animals are useful for studying the function and/or activity of ORX protein and for identifying and/or evaluating modulators of ORX protein activity. As used herein, a "transgenic animal" is a non-human animal, preferably a mammal, more preferably a rodent such as a rat or mouse, in which one or more of the cells of the animal includes a transgene. Other examples of transgenic animals include non-human primates, sheep, dogs, cows, goats, chickens, amphibians, etc. A transgene is exogenous DNA that is integrated into the genome of a cell from which a transgenic animal develops and that remains in the genome of the mature animal, thereby directing the expression of an encoded gene product in one or more cell types or tissues of the transgenic animal. As used herein, a "homologous recombinant animal" is a non-human animal, preferably a mammal, more

preferably a mouse, in which an endogenous ORX gene has been altered by homologous recombination between the endogenous gene and an exogenous DNA molecule introduced into a cell of the animal, *e.g.*, an embryonic cell of the animal, prior to development of the animal.

A transgenic animal of the invention can be created by introducing ORX-encoding nucleic acid into the male pronuclei of a fertilized oocyte (*e.g.*, by microinjection, retroviral infection) and allowing the oocyte to develop in a pseudopregnant female foster animal. Sequences including GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 can be introduced as a transgene into the genome of a non-human animal. Alternatively, a non-human homologue of the human ORX gene, such as a mouse ORX gene, can be isolated based on hybridization to the human ORX cDNA (described further *supra*) and used as a transgene. Intronic sequences and polyadenylation signals can also be included in the transgene to increase the efficiency of expression of the transgene. A tissue-specific regulatory sequence(s) can be operably-linked to the ORX transgene to direct expression of ORX protein to particular cells. Methods for generating transgenic animals via embryo manipulation and microinjection, particularly animals such as mice, have become conventional in the art and are described, for example, in U.S. Patent Nos. 4,736,866; 4,870,009; and 4,873,191; and Hogan, 1986. In: MANIPULATING THE MOUSE EMBRYO, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y. Similar methods are used for production of other transgenic animals. A transgenic founder animal can be identified based upon the presence of the ORX transgene in its genome and/or expression of ORX mRNA in tissues or cells of the animals. A transgenic founder animal can then be used to breed additional animals carrying the transgene. Moreover, transgenic animals carrying a transgene-encoding ORX protein can further be bred to other transgenic animals carrying other transgenes.

To create a homologous recombinant animal, a vector is prepared which contains at least a portion of an ORX gene into which a deletion, addition or substitution has been introduced to thereby alter, *e.g.*, functionally disrupt, the ORX gene. The ORX gene can be a human gene, but more preferably, is a non-human homologue of a human ORX gene. For example, a mouse homologue of human ORX gene of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, can be used to construct a homologous recombination vector suitable for altering an endogenous ORX gene in the mouse genome. In one embodiment, the vector is designed such that, upon homologous recombination, the

endogenous ORX gene is functionally disrupted (*i.e.*, no longer encodes a functional protein; also referred to as a "knock out" vector).

Alternatively, the vector can be designed such that, upon homologous recombination, the endogenous ORX gene is mutated or otherwise altered but still encodes functional protein (*e.g.*, the upstream regulatory region can be altered to thereby alter the expression of the endogenous ORX protein). In the homologous recombination vector, the altered portion of the ORX gene is flanked at its 5'- and 3'-termini by additional nucleic acid of the ORX gene to allow for homologous recombination to occur between the exogenous ORX gene carried by the vector and an endogenous ORX gene in an embryonic stem cell. The additional flanking ORX nucleic acid is of sufficient length for successful homologous recombination with the endogenous gene. Typically, several kilobases of flanking DNA (both at the 5'- and 3'-termini) are included in the vector. *See, e.g.*, Thomas, *et al.*, 1987. *Cell* 51: 503 for a description of homologous recombination vectors. The vector is then introduced into an embryonic stem cell line (*e.g.*, by electroporation) and cells in which the introduced ORX gene has homologously-recombined with the endogenous ORX gene are selected. *See, e.g.*, Li, *et al.*, 1992. *Cell* 69: 915.

The selected cells are then injected into a blastocyst of an animal (*e.g.*, a mouse) to form aggregation chimeras. *See, e.g.*, Bradley, 1987. In: TERATOCARCINOMAS AND EMBRYONIC STEM CELLS: A PRACTICAL APPROACH, Robertson, ed. IRL, Oxford, pp. 113-152. A chimeric embryo can then be implanted into a suitable pseudopregnant female foster animal and the embryo brought to term. Progeny harboring the homologously-recombined DNA in their germ cells can be used to breed animals in which all cells of the animal contain the homologously-recombined DNA by germline transmission of the transgene. Methods for constructing homologous recombination vectors and homologous recombinant animals are described further in Bradley, 1991. *Curr. Opin. Biotechnol.* 2: 823-829; PCT International Publication Nos.: WO 90/11354; WO 91/01140; WO 92/0968; and WO 93/04169.

In another embodiment, transgenic non-humans animals can be produced that contain selected systems that allow for regulated expression of the transgene. One example of such a system is the cre/loxP recombinase system of bacteriophage P1. For a description of the cre/loxP recombinase system, *See, e.g.*, Lakso, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 6232-6236. Another example of a recombinase system is the FLP recombinase system of *Saccharomyces cerevisiae*. *See, O'Gorman, et al.*, 1991. *Science* 251:1351-1355. If a cre/loxP recombinase

system is used to regulate expression of the transgene, animals containing transgenes encoding both the Cre recombinase and a selected protein are required. Such animals can be provided through the construction of "double" transgenic animals, *e.g.*, by mating two transgenic animals, one containing a transgene encoding a selected protein and the other containing a transgene encoding a recombinase.

Clones of the non-human transgenic animals described herein can also be produced according to the methods described in Wilmut, *et al.*, 1997. *Nature* 385: 810-813. In brief, a cell (*e.g.*, a somatic cell) from the transgenic animal can be isolated and induced to exit the growth cycle and enter G<sub>0</sub> phase. The quiescent cell can then be fused, *e.g.*, through the use of electrical pulses, to an enucleated oocyte from an animal of the same species from which the quiescent cell is isolated. The reconstructed oocyte is then cultured such that it develops to morula or blastocyte and then transferred to pseudopregnant female foster animal. The offspring borne of this female foster animal will be a clone of the animal from which the cell (*e.g.*, the somatic cell) is isolated.

### **Pharmaceutical Compositions**

The ORX nucleic acid molecules, ORX proteins, and anti-ORX antibodies (also referred to herein as "active compounds") of the invention, and derivatives, fragments, analogs and homologs thereof, can be incorporated into pharmaceutical compositions suitable for administration. Such compositions typically comprise the nucleic acid molecule, protein, or antibody and a pharmaceutically acceptable carrier. As used herein, "pharmaceutically acceptable carrier" is intended to include any and all solvents, dispersion media, coatings, antibacterial and antifungal agents, isotonic and absorption delaying agents, and the like, compatible with pharmaceutical administration. Suitable carriers are described in the most recent edition of Remington's Pharmaceutical Sciences, a standard reference text in the field, which is incorporated herein by reference. Preferred examples of such carriers or diluents include, but are not limited to, water, saline, finger's solutions, dextrose solution, and 5% human serum albumin. Liposomes and non-aqueous vehicles such as fixed oils may also be used. The use of such media and agents for pharmaceutically active substances is well known in the art. Except insofar as any conventional media or agent is incompatible with the active compound, use

thereof in the compositions is contemplated. Supplementary active compounds can also be incorporated into the compositions.

The antibodies disclosed herein can also be formulated as immunoliposomes.

Liposomes containing the antibody are prepared by methods known in the art, such as described  
5 in Epstein et al., Proc. Natl. Acad. Sci. USA, 82: 3688 (1985); Hwang et al., Proc. Natl. Acad. Sci. USA, 77: 4030 (1980); and U.S. Pat. Nos. 4,485,045 and 4,544,545. Liposomes with enhanced circulation time are disclosed in U.S. Patent No. 5,013,556.

Particularly useful liposomes can be generated by the reverse-phase evaporation method with a lipid composition comprising phosphatidylcholine, cholesterol, and PEG-derivatized  
10 phosphatidylethanolamine (PEG-PE). Liposomes are extruded through filters of defined pore size to yield liposomes with the desired diameter. Fab' fragments of the antibody of the present invention can be conjugated to the liposomes as described in Martin et al., J. Biol. Chem., 257: 286-288 (1982) via a disulfide-interchange reaction. A chemotherapeutic agent (such as Doxorubicin) is optionally contained within the liposome. See Gabizon et al., J. National Cancer  
15 Inst., 81(19): 1484 (1989).

A pharmaceutical composition of the invention is formulated to be compatible with its intended route of administration. Examples of routes of administration include parenteral, *e.g.*, intravenous, intradermal, subcutaneous, oral (*e.g.*, inhalation), transdermal (*i.e.*, topical), transmucosal, and rectal administration. Solutions or suspensions used for parenteral,  
20 intradermal, or subcutaneous application can include the following components: a sterile diluent such as water for injection, saline solution, fixed oils, polyethylene glycols, glycerine, propylene glycol or other synthetic solvents; antibacterial agents such as benzyl alcohol or methyl parabens; antioxidants such as ascorbic acid or sodium bisulfite; chelating agents such as ethylenediaminetetraacetic acid (EDTA); buffers such as acetates, citrates or phosphates, and  
25 agents for the adjustment of tonicity such as sodium chloride or dextrose. The pH can be adjusted with acids or bases, such as hydrochloric acid or sodium hydroxide. The parenteral preparation can be enclosed in ampoules, disposable syringes or multiple dose vials made of glass or plastic.

Pharmaceutical compositions suitable for injectable use include sterile aqueous solutions  
30 (where water soluble) or dispersions and sterile powders for the extemporaneous preparation of sterile injectable solutions or dispersion. For intravenous administration, suitable carriers include



physiological saline, bacteriostatic water, Cremophor EL™ (BASF, Parsippany, N.J.) or phosphate buffered saline (PBS). In all cases, the composition must be sterile and should be fluid to the extent that easy syringeability exists. It must be stable under the conditions of manufacture and storage and must be preserved against the contaminating action of

5 microorganisms such as bacteria and fungi. The carrier can be a solvent or dispersion medium containing, for example, water, ethanol, polyol (for example, glycerol, propylene glycol, and liquid polyethylene glycol, and the like), and suitable mixtures thereof. The proper fluidity can be maintained, for example, by the use of a coating such as lecithin, by the maintenance of the required particle size in the case of dispersion and by the use of surfactants. Prevention of the

10 action of microorganisms can be achieved by various antibacterial and antifungal agents, for example, parabens, chlorobutanol, phenol, ascorbic acid, thimerosal, and the like. In many cases, it will be preferable to include isotonic agents, for example, sugars, polyalcohols such as manitol, sorbitol, sodium chloride in the composition. Prolonged absorption of the injectable compositions can be brought about by including in the composition an agent which delays

15 absorption, for example, aluminum monostearate and gelatin.

Sterile injectable solutions can be prepared by incorporating the active compound (*e.g.*, an ORX protein or anti-ORX antibody) in the required amount in an appropriate solvent with one or a combination of ingredients enumerated above, as required, followed by filtered sterilization. Generally, dispersions are prepared by incorporating the active compound into a sterile vehicle

20 that contains a basic dispersion medium and the required other ingredients from those enumerated above. In the case of sterile powders for the preparation of sterile injectable solutions, methods of preparation are vacuum drying and freeze-drying that yields a powder of the active ingredient plus any additional desired ingredient from a previously sterile-filtered solution thereof.

25 Oral compositions generally include an inert diluent or an edible carrier. They can be enclosed in gelatin capsules or compressed into tablets. For the purpose of oral therapeutic administration, the active compound can be incorporated with excipients and used in the form of tablets, troches, or capsules. Oral compositions can also be prepared using a fluid carrier for use as a mouthwash, wherein the compound in the fluid carrier is applied orally and swished and

30 expectorated or swallowed. Pharmaceutically compatible binding agents, and/or adjuvant materials can be included as part of the composition. The tablets, pills, capsules, troches and the

like can contain any of the following ingredients, or compounds of a similar nature: a binder such as microcrystalline cellulose, gum tragacanth or gelatin; an excipient such as starch or lactose, a disintegrating agent such as alginic acid, Primogel, or corn starch; a lubricant such as magnesium stearate or Sterotes; a glidant such as colloidal silicon dioxide; a sweetening agent such as sucrose or saccharin; or a flavoring agent such as peppermint, methyl salicylate, or orange flavoring.

For administration by inhalation, the compounds are delivered in the form of an aerosol spray from pressured container or dispenser which contains a suitable propellant, *e.g.*, a gas such as carbon dioxide, or a nebulizer.

Systemic administration can also be by transmucosal or transdermal means. For transmucosal or transdermal administration, penetrants appropriate to the barrier to be permeated are used in the formulation. Such penetrants are generally known in the art, and include, for example, for transmucosal administration, detergents, bile salts, and fusidic acid derivatives. Transmucosal administration can be accomplished through the use of nasal sprays or suppositories. For transdermal administration, the active compounds are formulated into ointments, salves, gels, or creams as generally known in the art.

The compounds can also be prepared in the form of suppositories (*e.g.*, with conventional suppository bases such as cocoa butter and other glycerides) or retention enemas for rectal delivery.

In one embodiment, the active compounds are prepared with carriers that will protect the compound against rapid elimination from the body, such as a controlled release formulation, including implants and microencapsulated delivery systems. Biodegradable, biocompatible polymers can be used, such as ethylene vinyl acetate, polyanhydrides, polyglycolic acid, collagen, polyorthoesters, and polylactic acid. Methods for preparation of such formulations will be apparent to those skilled in the art. The materials can also be obtained commercially from Alza Corporation and Nova Pharmaceuticals, Inc. Liposomal suspensions (including liposomes targeted to infected cells with monoclonal antibodies to viral antigens) can also be used as pharmaceutically acceptable carriers. These can be prepared according to methods known to those skilled in the art, for example, as described in U.S. Patent No. 4,522,811.

It is especially advantageous to formulate oral or parenteral compositions in dosage unit form for ease of administration and uniformity of dosage. Dosage unit form as used herein refers

to physically discrete units suited as unitary dosages for the subject to be treated; each unit containing a predetermined quantity of active compound calculated to produce the desired therapeutic effect in association with the required pharmaceutical carrier. The specification for the dosage unit forms of the invention are dictated by and directly dependent on the unique characteristics of the active compound and the particular therapeutic effect to be achieved, and the limitations inherent in the art of compounding such an active compound for the treatment of individuals.

The nucleic acid molecules of the invention can be inserted into vectors and used as gene therapy vectors. Gene therapy vectors can be delivered to a subject by, for example, intravenous injection, local administration (*see, e.g.*, U.S. Patent No. 5,328,470) or by stereotactic injection (*see, e.g.*, Chen, *et al.*, 1994. *Proc. Natl. Acad. Sci. USA* 91: 3054-3057). The pharmaceutical preparation of the gene therapy vector can include the gene therapy vector in an acceptable diluent, or can comprise a slow release matrix in which the gene delivery vehicle is imbedded. Alternatively, where the complete gene delivery vector can be produced intact from recombinant cells, *e.g.*, retroviral vectors, the pharmaceutical preparation can include one or more cells that produce the gene delivery system.

Antibodies specifically binding a protein of the invention, as well as other molecules identified by the screening assays disclosed herein, can be administered for the treatment of various disorders in the form of pharmaceutical compositions. Principles and considerations involved in preparing such compositions, as well as guidance in the choice of components are provided, for example, in Remington : The Science And Practice Of Pharmacy 19th ed. (Alfonso R. Gennaro, et al., editors) Mack Pub. Co., Easton, Pa.: 1995; Drug Absorption Enhancement : Concepts, Possibilities, Limitations, And Trends, Harwood Academic Publishers, Langhorne, Pa., 1994; and Peptide And Protein Drug Delivery (Advances In Parenteral Sciences, Vol. 4), 1991, M. Dekker, New York. If the antigenic protein is intracellular and whole antibodies are used as inhibitors, internalizing antibodies are preferred. However, liposomes can also be used to deliver the antibody, or an antibody fragment, into cells. Where antibody fragments are used, the smallest inhibitory fragment that specifically binds to the binding domain of the target protein is preferred. For example, based upon the variable-region sequences of an antibody, peptide molecules can be designed that retain the ability to bind the target protein sequence. Such peptides can be synthesized chemically and/or produced by recombinant DNA technology. See,

*e.g.*, Marasco *et al.*, 1993 *Proc. Natl. Acad. Sci. USA*, 90: 7889-7893. The formulation herein can also contain more than one active compound as necessary for the particular indication being treated, preferably those with complementary activities that do not adversely affect each other. Alternatively, or in addition, the composition can comprise an agent that enhances its function, such as, for example, a cytotoxic agent, cytokine, chemotherapeutic agent, or growth-inhibitory agent. Such molecules are suitably present in combination in amounts that are effective for the purpose intended. The active ingredients can also be entrapped in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization, for example, hydroxymethylcellulose or gelatin-microcapsules and poly-(methylmethacrylate) microcapsules, respectively, in colloidal drug delivery systems (for example, liposomes, albumin microspheres, microemulsions, nano-particles, and nanocapsules) or in macroemulsions.

The formulations to be used for *in vivo* administration must be sterile. This is readily accomplished by filtration through sterile filtration membranes.

Sustained-release preparations can be prepared. Suitable examples of sustained-release preparations include semipermeable matrices of solid hydrophobic polymers containing the antibody, which matrices are in the form of shaped articles, *e.g.*, films, or microcapsules. Examples of sustained-release matrices include polyesters, hydrogels (for example, poly(2-hydroxyethyl-methacrylate), or poly(vinylalcohol)), polylactides (U.S. Pat. No. 3,773,919), copolymers of L-glutamic acid and ? ethyl-L-glutamate, non-degradable ethylene-vinyl acetate, degradable lactic acid-glycolic acid copolymers such as the LUPRON DEPOT<sup>TM</sup> (injectable microspheres composed of lactic acid-glycolic acid copolymer and leuprolide acetate), and poly-D-(-)-3-hydroxybutyric acid. While polymers such as ethylene-vinyl acetate and lactic acid-glycolic acid enable release of molecules for over 100 days, certain hydrogels release proteins for shorter time periods.

The pharmaceutical compositions can be included in a container, pack, or dispenser together with instructions for administration.

### Screening and Detection Methods

The isolated nucleic acid molecules of the invention can be used to express ORX protein (*e.g.*, via a recombinant expression vector in a host cell in gene therapy applications), to detect ORX mRNA (*e.g.*, in a biological sample) or a genetic lesion in an ORX gene, and to modulate

ORX activity, as described further, below. In addition, the ORX proteins can be used to screen drugs or compounds that modulate the ORX protein activity or expression as well as to treat disorders characterized by insufficient or excessive production of ORX protein or production of ORX protein forms that have decreased or aberrant activity compared to ORX wild-type protein .

5 In addition, the anti-ORX antibodies of the invention can be used to detect and isolate ORX proteins and modulate ORX activity. For example, ORX activity includes growth and differentiation, antibody production, and tumor growth.

The invention further pertains to novel agents identified by the screening assays described herein and uses thereof for treatments as described, *supra*.

#### 10 *Screening Assays*

The invention provides a method (also referred to herein as a "screening assay") for identifying modulators, *i.e.*, candidate or test compounds or agents (*e.g.*, peptides, peptidomimetics, small molecules or other drugs) that bind to ORX proteins or have a stimulatory or inhibitory effect on, *e.g.*, ORX protein expression or ORX protein activity. The  
15 invention also includes compounds identified in the screening assays described herein.

In one embodiment, the invention provides assays for screening candidate or test compounds which bind to or modulate the activity of the membrane-bound form of an ORX protein or polypeptide or biologically-active portion thereof. The test compounds of the invention can be obtained using any of the numerous approaches in combinatorial library  
20 methods known in the art, including: biological libraries; spatially addressable parallel solid phase or solution phase libraries; synthetic library methods requiring deconvolution; the "one-bead one-compound" library method; and synthetic library methods using affinity chromatography selection. The biological library approach is limited to peptide libraries, while the other four approaches are applicable to peptide, non-peptide oligomer or small molecule  
25 libraries of compounds. *See, e.g.*, Lam, 1997. *Anticancer Drug Design* 12: 145.

A "small molecule" as used herein, is meant to refer to a composition that has a molecular weight of less than about 5 kD and most preferably less than about 4 kD. Small molecules can be, *e.g.*, nucleic acids, peptides, polypeptides, peptidomimetics, carbohydrates, lipids or other organic or inorganic molecules. Libraries of chemical and/or biological mixtures, such as fungal,  
30 bacterial, or algal extracts, are known in the art and can be screened with any of the assays of the invention.

Examples of methods for the synthesis of molecular libraries can be found in the art, for example in: DeWitt, *et al.*, 1993. *Proc. Natl. Acad. Sci. U.S.A.* 90: 6909; Erb, *et al.*, 1994. *Proc. Natl. Acad. Sci. U.S.A.* 91: 11422; Zuckermann, *et al.*, 1994. *J. Med. Chem.* 37: 2678; Cho, *et al.*, 1993. *Science* 261: 1303; Carrell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2059; Carell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2061; and Gallop, *et al.*, 1994. *J. Med. Chem.* 37: 1233.

Libraries of compounds may be presented in solution (*e.g.*, Houghten, 1992. *Biotechniques* 13: 412-421), or on beads (Lam, 1991. *Nature* 354: 82-84), on chips (Fodor, 1993. *Nature* 364: 555-556), bacteria (Ladner, U.S. Patent No. 5,223,409), spores (Ladner, U.S. Patent 10 5,233,409), plasmids (Cull, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 1865-1869) or on phage (Scott and Smith, 1990. *Science* 249: 386-390; Devlin, 1990. *Science* 249: 404-406; Cwirla, *et al.*, 1990. *Proc. Natl. Acad. Sci. U.S.A.* 87: 6378-6382; Felici, 1991. *J. Mol. Biol.* 222: 301-310; Ladner, U.S. Patent No. 5,233,409.).

In one embodiment, an assay is a cell-based assay in which a cell which expresses a  
15 membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface is contacted with a test compound and the ability of the test compound to bind to an ORX protein determined. The cell, for example, can be of mammalian origin or a yeast cell.  
Determining the ability of the test compound to bind to the ORX protein can be accomplished, for example, by coupling the test compound with a radioisotope or enzymatic label such that  
20 binding of the test compound to the ORX protein or biologically-active portion thereof can be determined by detecting the labeled compound in a complex. For example, test compounds can be labeled with  $^{125}\text{I}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$ , or  $^3\text{H}$ , either directly or indirectly, and the radioisotope detected by direct counting of radioemission or by scintillation counting. Alternatively, test compounds can be enzymatically-labeled with, for example, horseradish peroxidase, alkaline phosphatase, or  
25 luciferase, and the enzymatic label detected by determination of conversion of an appropriate substrate to product. In one embodiment, the assay comprises contacting a cell which expresses a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact  
30 with an ORX protein, wherein determining the ability of the test compound to interact with an

ORX protein comprises determining the ability of the test compound to preferentially bind to ORX protein or a biologically-active portion thereof as compared to the known compound.

In another embodiment, an assay is a cell-based assay comprising contacting a cell expressing a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a test compound and determining the ability of the test compound to modulate (*e.g.*, stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX or a biologically-active portion thereof can be accomplished, for example, by determining the ability of the ORX protein to bind to or interact with an ORX target molecule. As used herein, a "target molecule" is a molecule with which an ORX protein binds or interacts in nature, for example, a molecule on the surface of a cell which expresses an ORX interacting protein, a molecule on the surface of a second cell, a molecule in the extracellular milieu, a molecule associated with the internal surface of a cell membrane or a cytoplasmic molecule. An ORX target molecule can be a non-ORX molecule or an ORX protein or polypeptide of the invention. In one embodiment, an ORX target molecule is a component of a signal transduction pathway that facilitates transduction of an extracellular signal (*e.g.* a signal generated by binding of a compound to a membrane-bound ORX molecule) through the cell membrane and into the cell. The target, for example, can be a second intercellular protein that has catalytic activity or a protein that facilitates the association of downstream signaling molecules with ORX.

Determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by one of the methods described above for determining direct binding. In one embodiment, determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by determining the activity of the target molecule. For example, the activity of the target molecule can be determined by detecting induction of a cellular second messenger of the target (*i.e.* intracellular  $\text{Ca}^{2+}$ , diacylglycerol,  $\text{IP}_3$ , etc.), detecting catalytic/enzymatic activity of the target an appropriate substrate, detecting the induction of a reporter gene (comprising an ORX-responsive regulatory element operatively linked to a nucleic acid encoding a detectable marker, *e.g.*, luciferase), or detecting a cellular response, for example, cell survival, cellular differentiation, or cell proliferation.

In yet another embodiment, an assay of the invention is a cell-free assay comprising contacting an ORX protein or biologically-active portion thereof with a test compound and

determining the ability of the test compound to bind to the ORX protein or biologically-active portion thereof. Binding of the test compound to the ORX protein can be determined either directly or indirectly as described above. In one such embodiment, the assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the test compound to preferentially bind to ORX or biologically-active portion thereof as compared to the known compound.

In still another embodiment, an assay is a cell-free assay comprising contacting ORX protein or biologically-active portion thereof with a test compound and determining the ability of the test compound to modulate (*e.g.* stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX can be accomplished, for example, by determining the ability of the ORX protein to bind to an ORX target molecule by one of the methods described above for determining direct binding. In an alternative embodiment, determining the ability of the test compound to modulate the activity of ORX protein can be accomplished by determining the ability of the ORX protein further modulate an ORX target molecule. For example, the catalytic/enzymatic activity of the target molecule on an appropriate substrate can be determined as described above.

In yet another embodiment, the cell-free assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX protein to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the ORX protein to preferentially bind to or modulate the activity of an ORX target molecule.

The cell-free assays of the invention are amenable to use of both the soluble form or the membrane-bound form of ORX protein. In the case of cell-free assays comprising the membrane-bound form of ORX protein, it may be desirable to utilize a solubilizing agent such that the membrane-bound form of ORX protein is maintained in solution. Examples of such solubilizing agents include non-ionic detergents such as n-octylglucoside, n-dodecylglucoside,



n-dodecylmaltoside, octanoyl-N-methylglucamide, decanoyl-N-methylglucamide, Triton<sup>®</sup> X-100, Triton<sup>®</sup> X-114, Thesit<sup>®</sup>, Isotridecypoly(ethylene glycol ether)<sub>n</sub>, N-dodecyl--  
N,N-dimethyl-3-ammonio-1-propane sulfonate, 3-(3-cholamidopropyl) dimethylamminiol-  
1-propane sulfonate (CHAPS), or 3-(3-cholamidopropyl)dimethylamminiol-2-hydroxy-1-propane  
5 sulfonate (CHAPSO).

In more than one embodiment of the above assay methods of the invention, it may be  
desirable to immobilize either ORX protein or its target molecule to facilitate separation of  
complexed from uncomplexed forms of one or both of the proteins, as well as to accommodate  
automation of the assay. Binding of a test compound to ORX protein, or interaction of ORX  
10 protein with a target molecule in the presence and absence of a candidate compound, can be  
accomplished in any vessel suitable for containing the reactants. Examples of such vessels  
include microtiter plates, test tubes, and micro-centrifuge tubes. In one embodiment, a fusion  
protein can be provided that adds a domain that allows one or both of the proteins to be bound to  
a matrix. For example, GST-ORX fusion proteins or GST-target fusion proteins can be adsorbed  
15 onto glutathione sepharose beads (Sigma Chemical, St. Louis, MO) or glutathione derivatized  
microtiter plates, that are then combined with the test compound or the test compound and either  
the non-adsorbed target protein or ORX protein, and the mixture is incubated under conditions  
conducive to complex formation (*e.g.*, at physiological conditions for salt and pH). Following  
incubation, the beads or microtiter plate wells are washed to remove any unbound components,  
20 the matrix immobilized in the case of beads, complex determined either directly or indirectly, for  
example, as described, *supra*. Alternatively, the complexes can be dissociated from the matrix,  
and the level of ORX protein binding or activity determined using standard techniques.

Other techniques for immobilizing proteins on matrices can also be used in the screening  
assays of the invention. For example, either the ORX protein or its target molecule can be  
25 immobilized utilizing conjugation of biotin and streptavidin. Biotinylated ORX protein or target  
molecules can be prepared from biotin-NHS (N-hydroxy-succinimide) using techniques well-  
known within the art (*e.g.*, biotinylation kit, Pierce Chemicals, Rockford, Ill.), and immobilized  
in the wells of streptavidin-coated 96 well plates (Pierce Chemical). Alternatively, antibodies  
reactive with ORX protein or target molecules, but which do not interfere with binding of the  
30 ORX protein to its target molecule, can be derivatized to the wells of the plate, and unbound  
target or ORX protein trapped in the wells by antibody conjugation. Methods for detecting such

complexes, in addition to those described above for the GST-immobilized complexes, include immunodetection of complexes using antibodies reactive with the ORX protein or target molecule, as well as enzyme-linked assays that rely on detecting an enzymatic activity associated with the ORX protein or target molecule.

5 In another embodiment, modulators of ORX protein expression are identified in a method wherein a cell is contacted with a candidate compound and the expression of ORX mRNA or protein in the cell is determined. The level of expression of ORX mRNA or protein in the presence of the candidate compound is compared to the level of expression of ORX mRNA or protein in the absence of the candidate compound. The candidate compound can then be  
10 identified as a modulator of ORX mRNA or protein expression based upon this comparison. For example, when expression of ORX mRNA or protein is greater (*i.e.*, statistically significantly greater) in the presence of the candidate compound than in its absence, the candidate compound is identified as a stimulator of ORX mRNA or protein expression. Alternatively, when expression of ORX mRNA or protein is less (statistically significantly less) in the presence of the  
15 candidate compound than in its absence, the candidate compound is identified as an inhibitor of ORX mRNA or protein expression. The level of ORX mRNA or protein expression in the cells can be determined by methods described herein for detecting ORX mRNA or protein.

In yet another aspect of the invention, the ORX proteins can be used as "bait proteins" in a two-hybrid assay or three hybrid assay (*see, e.g.*, U.S. Patent No. 5,283,317; Zervos, *et al.*,  
20 1993. *Cell* 72: 223-232; Madura, *et al.*, 1993. *J. Biol. Chem.* 268: 12046-12054; Bartel, *et al.*, 1993. *Biotechniques* 14: 920-924; Iwabuchi, *et al.*, 1993. *Oncogene* 8: 1693-1696; and Brent WO 94/10300), to identify other proteins that bind to or interact with ORX ("ORX-binding proteins" or "ORX-bp") and modulate ORX activity. Such ORX-binding proteins are also likely to be involved in the propagation of signals by the ORX proteins as, for example, upstream or  
25 downstream elements of the ORX pathway.

The two-hybrid system is based on the modular nature of most transcription factors, which consist of separable DNA-binding and activation domains. Briefly, the assay utilizes two different DNA constructs. In one construct, the gene that codes for ORX is fused to a gene encoding the DNA binding domain of a known transcription factor (*e.g.*, GAL-4). In the other  
30 construct, a DNA sequence, from a library of DNA sequences, that encodes an unidentified protein ("prey" or "sample") is fused to a gene that codes for the activation domain of the known

transcription factor. If the "bait" and the "prey" proteins are able to interact, *in vivo*, forming an ORX-dependent complex, the DNA-binding and activation domains of the transcription factor are brought into close proximity. This proximity allows transcription of a reporter gene (*e.g.*, LacZ) that is operably linked to a transcriptional regulatory site responsive to the transcription factor. Expression of the reporter gene can be detected and cell colonies containing the functional transcription factor can be isolated and used to obtain the cloned gene that encodes the protein which interacts with ORX.

The invention further pertains to novel agents identified by the aforementioned screening assays and uses thereof for treatments as described herein.

### Detection Assays

Portions or fragments of the cDNA sequences identified herein (and the corresponding complete gene sequences) can be used in numerous ways as polynucleotide reagents. By way of example, and not of limitation, these sequences can be used to: (i) identify an individual from a minute biological sample (tissue typing); and (ii) aid in forensic identification of a biological sample. Some of these applications are described in the subsections, below.

#### *Tissue Typing*

The ORX sequences of the invention can be used to identify individuals from minute biological samples. In this technique, an individual's genomic DNA is digested with one or more restriction enzymes, and probed on a Southern blot to yield unique bands for identification. The sequences of the invention are useful as additional DNA markers for RFLP ("restriction fragment length polymorphisms," described in U.S. Patent No. 5,272,057).

Furthermore, the sequences of the invention can be used to provide an alternative technique that determines the actual base-by-base DNA sequence of selected portions of an individual's genome. Thus, the ORX sequences described herein can be used to prepare two PCR primers from the 5'- and 3'-termini of the sequences. These primers can then be used to amplify an individual's DNA and subsequently sequence it.

Panels of corresponding DNA sequences from individuals, prepared in this manner, can provide unique individual identifications, as each individual will have a unique set of such DNA sequences due to allelic differences. The sequences of the invention can be used to obtain such identification sequences from individuals and from tissue. The ORX sequences of the invention

uniquely represent portions of the human genome. Allelic variation occurs to some degree in the coding regions of these sequences, and to a greater degree in the noncoding regions. It is estimated that allelic variation between individual humans occurs with a frequency of about once per each 500 bases. Much of the allelic variation is due to single nucleotide polymorphisms (SNPs), which include restriction fragment length polymorphisms (RFLPs).

Each of the sequences described herein can, to some degree, be used as a standard against which DNA from an individual can be compared for identification purposes. Because greater numbers of polymorphisms occur in the noncoding regions, fewer sequences are necessary to differentiate individuals. The noncoding sequences can comfortably provide positive individual identification with a panel of perhaps 10 to 1,000 primers that each yield a noncoding amplified sequence of 100 bases. If predicted coding sequences are used, a more appropriate number of primers for positive individual identification would be 500-2,000.

### **Predictive Medicine**

The invention also pertains to the field of predictive medicine in which diagnostic assays, prognostic assays, pharmacogenomics, and monitoring clinical trials are used for prognostic (predictive) purposes to thereby treat an individual prophylactically. Accordingly, one aspect of the invention relates to diagnostic assays for determining ORX protein and/or nucleic acid expression as well as ORX activity, in the context of a biological sample (*e.g.*, blood, serum, cells, tissue) to thereby determine whether an individual is afflicted with a disease or disorder, or is at risk of developing a disorder, associated with aberrant ORX expression or activity. Disorders associated with aberrant ORX expression or activity include, for example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

The invention also provides for prognostic (or predictive) assays for determining whether an individual is at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. For example, mutations in an ORX gene can be assayed in a biological sample. Such assays can be used for prognostic or predictive purpose to thereby prophylactically treat an individual prior to the onset of a disorder characterized by or associated with ORX protein, nucleic acid expression, or biological activity.

Another aspect of the invention provides methods for determining ORX protein, nucleic acid expression or activity in an individual to thereby select appropriate therapeutic or prophylactic agents for that individual (referred to herein as "pharmacogenomics").

Pharmacogenomics allows for the selection of agents (*e.g.*, drugs) for therapeutic or prophylactic treatment of an individual based on the genotype of the individual (*e.g.*, the genotype of the individual examined to determine the ability of the individual to respond to a particular agent.)

Yet another aspect of the invention pertains to monitoring the influence of agents (*e.g.*, drugs, compounds) on the expression or activity of ORX in clinical trials.

These and other agents are described in further detail in the following sections.

#### 10 *Diagnostic Assays*

An exemplary method for detecting the presence or absence of ORX in a biological sample involves obtaining a biological sample from a test subject and contacting the biological sample with a compound or an agent capable of detecting ORX protein or nucleic acid (*e.g.*, mRNA, genomic DNA) that encodes ORX protein such that the presence of ORX is detected in the biological sample. An agent for detecting ORX mRNA or genomic DNA is a labeled nucleic acid probe capable of hybridizing to ORX mRNA or genomic DNA. The nucleic acid probe can be, for example, a full-length ORX nucleic acid, or a portion thereof, such as an oligonucleotide of at least 15, 30, 50, 100, 250 or 500 nucleotides in length and sufficient to specifically hybridize under stringent conditions to ORX mRNA or genomic DNA. Other suitable probes for use in the diagnostic assays of the invention are described herein.

One agent for detecting ORX protein is an antibody capable of binding to ORX protein, preferably an antibody with a detectable label. Antibodies directed against a protein of the invention may be used in methods known within the art relating to the localization and/or quantitation of the protein (*e.g.*, for use in measuring levels of the protein within appropriate physiological samples, for use in diagnostic methods, for use in imaging the protein, and the like). In a given embodiment, antibodies against the proteins, or derivatives, fragments, analogs or homologs thereof, that contain the antigen binding domain, are utilized as pharmacologically-active compounds.

An antibody specific for a protein of the invention can be used to isolate the protein by standard techniques, such as immunoaffinity chromatography or immunoprecipitation. Such an antibody can facilitate the purification of the natural protein antigen from cells and of

recombinantly produced antigen expressed in host cells. Moreover, such an antibody can be used to detect the antigenic protein (*e.g.*, in a cellular lysate or cell supernatant) in order to evaluate the abundance and pattern of expression of the antigenic protein. Antibodies directed against the protein can be used diagnostically to monitor protein levels in tissue as part of a clinical testing procedure, *e.g.*, to, for example, determine the efficacy of a given treatment regimen. Detection can be facilitated by coupling (*i.e.*, physically linking) the antibody to a detectable substance. Examples of detectable substances include various enzymes, prosthetic groups, fluorescent materials, luminescent materials, bioluminescent materials, and radioactive materials. Examples of suitable enzymes include horseradish peroxidase, alkaline phosphatase,  $\beta$ -galactosidase, or acetylcholinesterase; examples of suitable prosthetic group complexes include streptavidin/biotin and avidin/biotin; examples of suitable fluorescent materials include umbelliferone, fluorescein, fluorescein isothiocyanate, rhodamine, dichlorotriazinylamine fluorescein, dansyl chloride or phycoerythrin; an example of a luminescent material includes luminol; examples of bioluminescent materials include luciferase, luciferin, and aequorin, and examples of suitable radioactive material include  $^{125}\text{I}$ ,  $^{131}\text{I}$ ,  $^{35}\text{S}$  or  $^3\text{H}$ .

Antibodies can be polyclonal, or more preferably, monoclonal. An intact antibody, or a fragment thereof (*e.g.*, Fab or  $\text{F(ab')}_2$ ) can be used. The term "labeled", with regard to the probe or antibody, is intended to encompass direct labeling of the probe or antibody by coupling (*i.e.*, physically linking) a detectable substance to the probe or antibody, as well as indirect labeling of the probe or antibody by reactivity with another reagent that is directly labeled. Examples of indirect labeling include detection of a primary antibody using a fluorescently-labeled secondary antibody and end-labeling of a DNA probe with biotin such that it can be detected with fluorescently-labeled streptavidin. The term "biological sample" is intended to include tissues, cells and biological fluids isolated from a subject, as well as tissues, cells and fluids present within a subject. That is, the detection method of the invention can be used to detect ORX mRNA, protein, or genomic DNA in a biological sample *in vitro* as well as *in vivo*. For example, *in vitro* techniques for detection of ORX mRNA include Northern hybridizations and *in situ* hybridizations. *In vitro* techniques for detection of ORX protein include enzyme linked immunosorbent assays (ELISAs), Western blots, immunoprecipitations, and immunofluorescence. *In vitro* techniques for detection of ORX genomic DNA include Southern hybridizations. Furthermore, *in vivo* techniques for detection of ORX protein include

introducing into a subject a labeled anti-ORX antibody. For example, the antibody can be labeled with a radioactive marker whose presence and location in a subject can be detected by standard imaging techniques.

5 In one embodiment, the biological sample contains protein molecules from the test subject. Alternatively, the biological sample can contain mRNA molecules from the test subject or genomic DNA molecules from the test subject. A preferred biological sample is a peripheral blood leukocyte sample isolated by conventional means from a subject.

10 In one embodiment, the methods further involve obtaining a control biological sample from a control subject, contacting the control sample with a compound or agent capable of detecting ORX protein, mRNA, or genomic DNA, such that the presence of ORX protein, mRNA or genomic DNA is detected in the biological sample, and comparing the presence of ORX protein, mRNA or genomic DNA in the control sample with the presence of ORX protein, mRNA or genomic DNA in the test sample.

15 The invention also encompasses kits for detecting the presence of ORX in a biological sample. For example, the kit can comprise: a labeled compound or agent capable of detecting ORX protein or mRNA in a biological sample; means for determining the amount of ORX in the sample; and means for comparing the amount of ORX in the sample with a standard. The compound or agent can be packaged in a suitable container. The kit can further comprise instructions for using the kit to detect ORX protein or nucleic acid.

#### 20 *Prognostic Assays*

The diagnostic methods described herein can furthermore be utilized to identify subjects having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. For example, the assays described herein, such as the preceding diagnostic assays or the following assays, can be utilized to identify a subject having or at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. Such disorders include for  
25 example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

Alternatively, the prognostic assays can be utilized to identify a subject having or at risk for developing a disease or disorder. Thus, the invention provides a method for identifying a  
30 disease or disorder associated with aberrant ORX expression or activity in which a test sample is obtained from a subject and ORX protein or nucleic acid (*e.g.*, mRNA, genomic DNA) is

detected, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. As used herein, a "test sample" refers to a biological sample obtained from a subject of interest. For example, a test sample can be a biological fluid (*e.g.*, serum), cell sample, or tissue.

5 Furthermore, the prognostic assays described herein can be used to determine whether a subject can be administered an agent (*e.g.*, an agonist, antagonist, peptidomimetic, protein, peptide, nucleic acid, small molecule, or other drug candidate) to treat a disease or disorder associated with aberrant ORX expression or activity. For example, such methods can be used to determine whether a subject can be effectively treated with an agent for a disorder. Thus, the  
10 invention provides methods for determining whether a subject can be effectively treated with an agent for a disorder associated with aberrant ORX expression or activity in which a test sample is obtained and ORX protein or nucleic acid is detected (*e.g.*, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject that can be administered the agent to treat a disorder associated with aberrant ORX expression or activity).

15 The methods of the invention can also be used to detect genetic lesions in an ORX gene, thereby determining if a subject with the lesioned gene is at risk for a disorder characterized by aberrant cell proliferation and/or differentiation. In various embodiments, the methods include detecting, in a sample of cells from the subject, the presence or absence of a genetic lesion characterized by at least one of an alteration affecting the integrity of a gene encoding an  
20 ORX-protein, or the misexpression of the ORX gene. For example, such genetic lesions can be detected by ascertaining the existence of at least one of: (i) a deletion of one or more nucleotides from an ORX gene; (ii) an addition of one or more nucleotides to an ORX gene; (iii) a substitution of one or more nucleotides of an ORX gene, (iv) a chromosomal rearrangement of an ORX gene; (v) an alteration in the level of a messenger RNA transcript of an ORX gene, (vi)  
25 aberrant modification of an ORX gene, such as of the methylation pattern of the genomic DNA, (vii) the presence of a non-wild-type splicing pattern of a messenger RNA transcript of an ORX gene, (viii) a non-wild-type level of an ORX protein, (ix) allelic loss of an ORX gene, and (x) inappropriate post-translational modification of an ORX protein. As described herein, there are a large number of assay techniques known in the art which can be used for detecting lesions in an  
30 ORX gene. A preferred biological sample is a peripheral blood leukocyte sample isolated by



conventional means from a subject. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

In certain embodiments, detection of the lesion involves the use of a probe/primer in a polymerase chain reaction (PCR) (*see, e.g.*, U.S. Patent Nos. 4,683,195 and 4,683,202), such as anchor PCR or RACE PCR, or, alternatively, in a ligation chain reaction (LCR) (*see, e.g.*, Landegran, *et al.*, 1988. *Science* 241: 1077-1080; and Nakazawa, *et al.*, 1994. *Proc. Natl. Acad. Sci. USA* 91: 360-364), the latter of which can be particularly useful for detecting point mutations in the ORX-gene (*see*, Abravaya, *et al.*, 1995. *Nucl. Acids Res.* 23: 675-682). This method can include the steps of collecting a sample of cells from a patient, isolating nucleic acid (*e.g.*, genomic, mRNA or both) from the cells of the sample, contacting the nucleic acid sample with one or more primers that specifically hybridize to an ORX gene under conditions such that hybridization and amplification of the ORX gene (if present) occurs, and detecting the presence or absence of an amplification product, or detecting the size of the amplification product and comparing the length to a control sample. It is anticipated that PCR and/or LCR may be desirable to use as a preliminary amplification step in conjunction with any of the techniques used for detecting mutations described herein.

Alternative amplification methods include: self sustained sequence replication (*see*, Guatelli, *et al.*, 1990. *Proc. Natl. Acad. Sci. USA* 87: 1874-1878), transcriptional amplification system (*see*, Kwoh, *et al.*, 1989. *Proc. Natl. Acad. Sci. USA* 86: 1173-1177); Q $\beta$  Replicase (*see*, Lizardi, *et al.*, 1988. *BioTechnology* 6: 1197), or any other nucleic acid amplification method, followed by the detection of the amplified molecules using techniques well known to those of skill in the art. These detection schemes are especially useful for the detection of nucleic acid molecules if such molecules are present in very low numbers.

In an alternative embodiment, mutations in an ORX gene from a sample cell can be identified by alterations in restriction enzyme cleavage patterns. For example, sample and control DNA is isolated, amplified (optionally), digested with one or more restriction endonucleases, and fragment length sizes are determined by gel electrophoresis and compared. Differences in fragment length sizes between sample and control DNA indicates mutations in the sample DNA. Moreover, the use of sequence specific ribozymes (*see, e.g.*, U.S. Patent No. 5,493,531) can be used to score for the presence of specific mutations by development or loss of a ribozyme cleavage site.

In other embodiments, genetic mutations in ORX can be identified by hybridizing a sample and control nucleic acids, *e.g.*, DNA or RNA, to high-density arrays containing hundreds or thousands of oligonucleotide probes. *See, e.g.*, Cronin, *et al.*, 1996. *Human Mutation* 7: 244-255; Kozal, *et al.*, 1996. *Nat. Med.* 2: 753-759. For example, genetic mutations in ORX can be identified in two dimensional arrays containing light-generated DNA probes as described in Cronin, *et al.*, *supra*. Briefly, a first hybridization array of probes can be used to scan through long stretches of DNA in a sample and control to identify base changes between the sequences by making linear arrays of sequential overlapping probes. This step allows the identification of point mutations. This is followed by a second hybridization array that allows the characterization of specific mutations by using smaller, specialized probe arrays complementary to all variants or mutations detected. Each mutation array is composed of parallel probe sets, one complementary to the wild-type gene and the other complementary to the mutant gene.

In yet another embodiment, any of a variety of sequencing reactions known in the art can be used to directly sequence the ORX gene and detect mutations by comparing the sequence of the sample ORX with the corresponding wild-type (control) sequence. Examples of sequencing reactions include those based on techniques developed by Maxim and Gilbert, 1977. *Proc. Natl. Acad. Sci. USA* 74: 560 or Sanger, 1977. *Proc. Natl. Acad. Sci. USA* 74: 5463. It is also contemplated that any of a variety of automated sequencing procedures can be utilized when performing the diagnostic assays (*see, e.g.*, Naeve, *et al.*, 1995. *Biotechniques* 19: 448), including sequencing by mass spectrometry (*see, e.g.*, PCT International Publication No. WO 94/16101; Cohen, *et al.*, 1996. *Adv. Chromatography* 36: 127-162; and Griffin, *et al.*, 1993. *Appl. Biochem. Biotechnol.* 38: 147-159).

Other methods for detecting mutations in the ORX gene include methods in which protection from cleavage agents is used to detect mismatched bases in RNA/RNA or RNA/DNA heteroduplexes. *See, e.g.*, Myers, *et al.*, 1985. *Science* 230: 1242. In general, the art technique of "mismatch cleavage" starts by providing heteroduplexes of formed by hybridizing (labeled) RNA or DNA containing the wild-type ORX sequence with potentially mutant RNA or DNA obtained from a tissue sample. The double-stranded duplexes are treated with an agent that cleaves single-stranded regions of the duplex such as which will exist due to basepair mismatches between the control and sample strands. For instance, RNA/DNA duplexes can be treated with RNase and DNA/DNA hybrids treated with S<sub>1</sub> nuclease to enzymatically digesting the

mismatched regions. In other embodiments, either DNA/DNA or RNA/DNA duplexes can be treated with hydroxylamine or osmium tetroxide and with piperidine in order to digest mismatched regions. After digestion of the mismatched regions, the resulting material is then separated by size on denaturing polyacrylamide gels to determine the site of mutation. *See, e.g.,* 5 Cotton, *et al.*, 1988. *Proc. Natl. Acad. Sci. USA* 85: 4397; Saleeba, *et al.*, 1992. *Methods Enzymol.* 217: 286-295. In an embodiment, the control DNA or RNA can be labeled for detection.

In still another embodiment, the mismatch cleavage reaction employs one or more proteins that recognize mismatched base pairs in double-stranded DNA (so called "DNA 10 mismatch repair" enzymes) in defined systems for detecting and mapping point mutations in ORX cDNAs obtained from samples of cells. For example, the mutY enzyme of *E. coli* cleaves A at G/A mismatches and the thymidine DNA glycosylase from HeLa cells cleaves T at G/T mismatches. *See, e.g.,* Hsu, *et al.*, 1994. *Carcinogenesis* 15: 1657-1662. According to an exemplary embodiment, a probe based on an ORX sequence, *e.g.*, a wild-type ORX sequence, is 15 hybridized to a cDNA or other DNA product from a test cell(s). The duplex is treated with a DNA mismatch repair enzyme, and the cleavage products, if any, can be detected from electrophoresis protocols or the like. *See, e.g.,* U.S. Patent No. 5,459,039.

In other embodiments, alterations in electrophoretic mobility will be used to identify mutations in ORX genes. For example, single strand conformation polymorphism (SSCP) may 20 be used to detect differences in electrophoretic mobility between mutant and wild type nucleic acids. *See, e.g.,* Orita, *et al.*, 1989. *Proc. Natl. Acad. Sci. USA*: 86: 2766; Cotton, 1993. *Mutat. Res.* 285: 125-144; Hayashi, 1992. *Genet. Anal. Tech. Appl.* 9: 73-79. Single-stranded DNA fragments of sample and control ORX nucleic acids will be denatured and allowed to renature. The secondary structure of single-stranded nucleic acids varies according to sequence, the 25 resulting alteration in electrophoretic mobility enables the detection of even a single base change. The DNA fragments may be labeled or detected with labeled probes. The sensitivity of the assay may be enhanced by using RNA (rather than DNA), in which the secondary structure is more sensitive to a change in sequence. In one embodiment, the subject method utilizes heteroduplex analysis to separate double stranded heteroduplex molecules on the basis of changes in 30 electrophoretic mobility. *See, e.g.,* Keen, *et al.*, 1991. *Trends Genet.* 7: 5.

In yet another embodiment, the movement of mutant or wild-type fragments in polyacrylamide gels containing a gradient of denaturant is assayed using denaturing gradient gel electrophoresis (DGGE). *See, e.g., Myers, et al., 1985. Nature 313: 495.* When DGGE is used as the method of analysis, DNA will be modified to insure that it does not completely denature, for example by adding a GC clamp of approximately 40 bp of high-melting GC-rich DNA by PCR. In a further embodiment, a temperature gradient is used in place of a denaturing gradient to identify differences in the mobility of control and sample DNA. *See, e.g., Rosenbaum and Reissner, 1987. Biophys. Chem. 265: 12753.*

Examples of other techniques for detecting point mutations include, but are not limited to, selective oligonucleotide hybridization, selective amplification, or selective primer extension. For example, oligonucleotide primers may be prepared in which the known mutation is placed centrally and then hybridized to target DNA under conditions that permit hybridization only if a perfect match is found. *See, e.g., Saiki, et al., 1986. Nature 324: 163; Saiki, et al., 1989. Proc. Natl. Acad. Sci. USA 86: 6230.* Such allele specific oligonucleotides are hybridized to PCR amplified target DNA or a number of different mutations when the oligonucleotides are attached to the hybridizing membrane and hybridized with labeled target DNA.

Alternatively, allele specific amplification technology that depends on selective PCR amplification may be used in conjunction with the instant invention. Oligonucleotides used as primers for specific amplification may carry the mutation of interest in the center of the molecule (so that amplification depends on differential hybridization; *see, e.g., Gibbs, et al., 1989. Nucl. Acids Res. 17: 2437-2448*) or at the extreme 3'-terminus of one primer where, under appropriate conditions, mismatch can prevent, or reduce polymerase extension (*see, e.g., Prossner, 1993. Tibtech. 11: 238*). In addition it may be desirable to introduce a novel restriction site in the region of the mutation to create cleavage-based detection. *See, e.g., Gasparini, et al., 1992. Mol. Cell Probes 6: 1.* It is anticipated that in certain embodiments amplification may also be performed using *Taq* ligase for amplification. *See, e.g., Barany, 1991. Proc. Natl. Acad. Sci. USA 88: 189.* In such cases, ligation will occur only if there is a perfect match at the 3'-terminus of the 5' sequence, making it possible to detect the presence of a known mutation at a specific site by looking for the presence or absence of amplification.

The methods described herein may be performed, for example, by utilizing pre-packaged diagnostic kits comprising at least one probe nucleic acid or antibody reagent described herein,

which may be conveniently used, *e.g.*, in clinical settings to diagnose patients exhibiting symptoms or family history of a disease or illness involving an ORX gene.

Furthermore, any cell type or tissue, preferably peripheral blood leukocytes, in which ORX is expressed may be utilized in the prognostic assays described herein. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

The invention will be further described in the following examples, which do not limit the scope of the invention described in the claims.

#### **EXAMPLE 1: Cloning and analysis of ORX-like sequences in primates and mouse.**

The isolation of ORX-related sequences has been described in Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. Briefly, 100 ng of genomic DNA from each species was subjected to PCR using consensus ORX primers OR5B-OR3B (OR5B (TM2), 5'-CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3' ; PMY(F/L)FL(S/A/T/G/C)NLS ; OR3B (TM7), (SEQ ID NO: 432) 5'-AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ ID NO:433) ; M(L/F/V/I)NPF(I/M)Y(S/C)L) (SEQ ID NO:434). See Ben-Arie et al., (1994) *Hum. Molec. Genet.* 3, 229-35. A second pair of consensus primers, OR3.1-OR7.1 (OR3.1 (TM3), 5'-GCIATGGCITA(C/T)GA(C/T)(A/C)GITA-3' (SEQ ID NO:435) ; AMAYD(S/R)Y (SEQ ID NO:436) ; OR7.1 (TM7), 5'-A(A/G)I(G/C)(A/T)(A/G)TA(A/G/T)AT(A/G)AAIGG(A/G)TT-3' (SEQ ID NO:437); NPFY(S/R/T/C/W)(L/F)(SEQ ID NO:438), was also used to amplify primate ORX sequences. See Freitag et al. (1998) *J. Comp. Physiol.* 183, 635-50 and Freitag et al., (1999) *Gene* 226, 165-74.

PCR products were subcloned in the TA vector (InVitrogen), and recombinant clones were identified by PCR. Sequencing of the ORX sequences was performed and sequences were assembled and analyzed. The following species were studied: human (*Homo sapiens*, HSA), chimpanzee (*Pan troglodytes*, PTR), gorilla (*Gorilla gorilla*, GGO), orangutan (*Pongo pygmaeus*, PPY), gibbon (*Hylobates lar*, HLA), macaque (*Macaca sylvanus*, MSY), baboon (*Papio papio*,

PPA), marmoset (*Callithrix jacchus*, CJA), squirrel-monkey (*Saimiri sciureus*, SSC, and *Saimiri boliviensis*, SBO), lemur (*Eulemur fulvus*, EFU, and *Eulemur rubriventer*, ERU), and mouse (*Mus musculus domesticus*, MMU). In addition, a few zebrafish (*Danio rerio*, DRE) sequences were also characterized using primers OR3.1-OR7.1.

- 5           Pairwise sequence comparisons and multiple alignments were performed using Gap and PileUp from the GCG package (Wisconsin Package version 8).

**EXAMPLE 2:           Construction and screening of an ORX-specific mouse sublibrary.**

- 10           Mouse ORX clones obtained by PCR as described above were gridded in 96-well microtiter dishes (1536 clones in 8 plates). For hybridization screening, the clones were robot-spotted in duplicate on high-density filters as described in Rouquier et al. (1999) *Mamm. Genome* 10, 1172-75.. Approximately 90% of the clones were identified as ORX genes. This library was screened to identify clones hybridizing to human ORX pseudogene sequences. Human plasmid
- 15   DNA probes were radiolabeled to a specific activity of 108-109 cpm/μg by random hexamer priming using (□-32P)-dCTP (Amersham) as described in Feinberg et al. (1983) *Anal. Biochem.* 132, 6-13. Filter hybridizations were carried out under standard hybridization conditions, and exposed to Kodak X-ray film at -80°C. See Rouquier et al., (1993) *Genomics* 17, 330-40.

- Three human ORX probes were used: OR1-72, OR912-47, OR15-71 (DDBJ/GenBank
- 20   accession numbers U86218, U86230, U86296 respectively).

**EXAMPLE 3:        Sequence analysis of mouse ORX sequences.**

To test whether mammals thought to be microsmatic or macrosmatic differ in the fraction of pseudogenes in their ORX repertoire, the ORX sequences in the mouse genome were surveyed. A mouse sublibrary enriched for ORX-related sequences amplified by PCR from the mouse genome was constructed, and nineteen randomly selected mouse ORX clones were sequenced. All 19 have an uninterrupted open-reading frame (ORF) and are potentially functional. These sequences group primarily in family 1 and vary from ~52 to >99% NSI. In addition, in an attempt to bias in favor of selecting mouse ORX pseudogenes, a search for mouse ORX sequences homologous to human pseudogenes was performed. One member was chosen from three different ORX pseudogene families: clones 1-72, 15-71 and 912-47 from chromosomes 1, 15 and 11, respectively. *See Rouquier et al., (1998) Nature Genet. 18, 243-50.* Each of these genes belongs to one of the 3 main groups of human ORX sequences and has accumulated a number of mutations such as stop codons and indel frameshifts. *See id.* The amino-acid sequence identity between these three ranges from 31% to 41%.

High density filters from the mouse ORX sublibrary were then hybridized separately with the three human pseudogene probes at a high stringency. Fourteen clones were sequenced on both strands. These sequences showed 38% to 53% ASI to the human sequences used to select them, indicating that they are not the orthologs of the human pseudogenes. All have an uninterrupted ORF from TM2 to TM7. Together, 33 mouse ORX sequences were sequenced, none of which contained characteristic features of pseudogenes.

**OTHER EMBODIMENTS**

While the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims.